SEQUENCE LISTING

| | SEQUENCE LISTING | |
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| <110> | INSTITUT PASTEUR CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE - CNRS JESTIN, JEAN-LUC VICHIER-GUERRE, SOPHIE FERRIS, STEPHANE | |
| <120> | METHODS FOR OBTAINING THERMOSTABLE ENZYMES, DNA POLYMERASE I VARIANTS FROM THERMUS AQUATICUS HAVING NEW CATALYTIC ACTIVITIES, METHODS FOR OBTAINING THE SAME, AND APPLICATIONS OF THE SAME | |
| <130> | 266426US0XCIP - 247440/D23127 | |
| | US 10/787,219 2004-02-27 | |
| <160> | 106 | |
| <170> | PatentIn version 3.3 | |
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       C and A, in the trimer sequence CAR and AVY, respectively
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C and A, in the trimer sequence CAR and AVY, respectively

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Y and R, in the trimer sequence YTG and RBT, respectively

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| | | | | GJĀ āāā | | | | | | | | 191 | |
| | | | | ctg Leu | | | | | | | | 239 | |
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| | | | | cgc Arg | | | | | | | | 383 | |
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| | | Glu | | | | ctt Leu 150 | | | | | | Val | | | | 479 |
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| | _ | | | | _ | ttg Leu | | _ | | | _ | | | | _ | 575 |
| _ | | | - | | _ | ttc Phe | _ | _ | _ | | | | | | | 623 |
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| | | | | | | ccc Pro | | | | | | | | | | 863 |
| | | | | | | acg Thr | | | | | | | | | | 911 _. |
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Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
100 105 110

Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg 115 120 125

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| gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc aaa gac ctg Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu 65 70 75 | 239 |
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| ggg gtg gcc cgg cgc tac ggc ggg gag tgg acg gag gag gcg ggg gag Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu 115 120 125 | 383 |
| cgg gcc gcc ctt tcc gag agg ctc ttc gcc aac ctg tgg ggg agg ctt Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu | 431 |

gag ggg gag qaq aqq ctc ctt tgg ctt tac cgg gag gtg gag agg ccc Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro ctt tcc gct gtc ctg gcc cac atg gag gcc acg ggg gtg cgc ctg gac Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp gtg gcc tat ctc agg gcc ttg tcc ctg gag gtg gcc gag gag atc gcc Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala cgc ctc gag gcc gag gtc ttc cgc ctg gcc ggc cac ccc ttc aac ctc Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu aac tcc cgg gac cag ctg gaa agg gtc ctc ttt gac gag cta ggg ctt Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu ccc gcc atc ggc aag acg gag aag acc ggc aag cgc tcc acc agc gcc Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala gcc gtc ctg ggg gcc ctc cgc gag gcc cac ccc atc gtg gag aag atc Ala Val Leu Gly Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile ctg cag tac cgg gag ctc acc aag ctg aag agc acc tac att gac ccc Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro ttg ccg gac ctc atc cac ccc agg acg ggc cgc ctc cac acc cgc ttc Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe aac cag acg gcc acg gcc agg cta agt agc tcc gat ccc aac Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn ctc cag aac atc ccc gtc cgc acc ccg ctt ggg cag agg atc cgc cgg Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg gcc ttc atc gcc gag gag ggg tgg cta ttg gtg acc ctg gac tat agc Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Thr Leu Asp Tyr Ser

cag ata gag ctc agg gtg ctg gcc cac ctc tcc ggc gac gag aac ctg

| Gln | . Ile | : Glu | Leu | Arg 340 | | Leu | Ala | His | Leu 345 | | Gly | Asp | Glu | Asn 350 | Leu | |
|-----|-------|-------|-----|------------|---|-----|-----|-----|------------|---|-----|-----|-------------------|------------|-----|------|
| | | | | | | | | | Ile | | | | acc Thr 365 | Āla | agc | 1103 |
| | _ | | Ğİy | _ | | | | Āla | | _ | | _ | atg Met | _ | | 1151 |
| | | Lys | | | | | | | | | | Met | tcg Ser | - | | 1199 |
| | | | _ | | | _ | | | | | | _ | cag Gln | _ | | 1247 |
| | | _ | | | _ | | | | _ | | | _ | tgg Trp | | | 1295 |
| | | | | | | | | | | | | | acc Thr 445 | | | 1343 |
| | _ | _ | _ | | | | _ | | | _ | | | aag Lys | _ | | 1391 |
| | | | _ | | _ | _ | | | | _ | | _ | cag Gln | | | 1439 |
| _ | _ | - | | _ | _ | _ | _ | _ | | _ | | | ccc Pro | | _ | 1487 |
| | _ | _ | Gly | _ | | _ | | | _ | _ | | _ | gag Glu | _ | _ | 1535 |
| | | | | | | | | | | | | | ctg Leu 525 | | | 1583 |
| | | | | | | Tyr | | | | | | | gag Glu | | | 1631 |

qtq qqq ata qqq qaq qac agg ctc tcc gcc aag gag gcg gcc gca ctg Val Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Leu gtg ccg cgc Val Pro Arg <210> <211> <212> PRT <213> Thermus aquaticus <400> 22 Met Ala Ser Gly Gly Gly Cys Gly Gly Gly Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Glu Gly Ala Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Gly Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Thr Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 480

Ala Asp. Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val 530 540

Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Leu Val

545 550 555 560

Pro Arg

| <21 | .1> | 23 1688 DNA Ther | | aqua | ticu | s | | | | | | | | | | |
|-----|-----|---------------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|-------------|
| | 1> | CDS (3). | .(16 | 88) | | | | | | | | | | | | |
| | atg | 23 gcc Ala | | Gly | | | | | Gly | | | | | Pro | | 47 |
| | | | | | | | | | | | | | | | Gly | 95 |
| | | | | | | | | | | | | | | | ctg Leu | 143 |
| | | gcc Ala 50 | | | | | | | | _ | | | | | | 19 1 |
| | | agg Arg | | | | | | | | | | | | | | 239 |
| | | ctg Leu | | | | | | | | | | | | | | 287 |
| | | ctc Leu | | | | | | | | | | | | | | 335 |
| | | gcc Ala | | | | | | | | | | | | | | 383 |
| cgg | gcc | gcc | ctt | tcc | gag | agg | ctc | ttc | gcc | aac | ctg | tgg | ggg | agg | ctt | 431 |

| Arg | Ala | Ala 130 | | . Ser | : Glu | Arg | Leu 135 | | Ala | . Asn | Leu | Trp 140 | Arg | Leu | | |
|-----|-----|------------|---|-------|-------------------|-----|------------|---|-----|-------|-----|------------|-------|------------|------|----------|
| - | | Glu | | | | | | | | | | Val | | ccc Pro | 47 | 9 |
| | Ser | - | _ | _ | gcc Ala 165 | | _ | _ | _ | _ | | | _ | _ | 52 | 7 |
| | | | | | gcc Ala | | | | | | | | | | 57 5 | 5 |
| | | | | | gtc Val | | | | | | | | | | 623 | 3 |
| | | | | | ctg Leu | | | | | | | | | | 67 🗆 | L |
| | _ | | | _ | acg Thr | | _ | | | _ | _ | | _ | _ | 719 | € |
| - | _ | _ | | _ | ctc Leu 245 | - | | _ | | | | | _ | | 767 | 7 |
| | | | | | ctc Leu | | | | | | | | | | 815 | ; |
| _ | - | _ | | | cac His | | | _ | | _ | | | _ | | 863 | ; |
| | | | | | caa Gln | | | | | | | | | | 911 | |
| Leu | _ | | | | gtc Val | - | | - | | Gly | _ | | _ | | 959 | |
| | | | | | gag Glu 325 | | | | Leu | | | | Tyr | | 1007 | |

| | | | | , Val | | | | | Ser | | | | | ctg Leu | 1055 |
|-----|-------------------|-----|-----|-------|-----|-----|---|-----|-----|---|-----|-----|-----|------------|-------|
| | | | Gln | | | | _ | Ile | | _ | | | Āla | agc Ser | 1103 |
| | ttc Phe 370 | Gly | _ | | | | _ | | | | _ | Met | _ | cgg Arg | 1151 |
| | aag Lys | | | | | | | | | | Met | | | | 1199 |
| | tcc Ser | | | | | | | | | | | | | | 1247 |
| | cgc Arg | | | | | | | | | | | | | | 1295 |
| | ctg Leu | | | | | | | | | | | | | | 1343 |
| | cgc Arg 450 | | | | | | | | | | | | | | 1391 |
| | gcg Ala | | | | | | | | | | | | | | 1439 |
| | gac Asp | | | | | | | | | | | | | | 1487 |
| | atg Met | | | | | | | | | | | | | | 1,535 |
| | gcc Ala | | | | | Ala | | | | | | | | | 1583 |
| Val | atg Met 530 | | | | Tyr | | | | | | | | | | 1631 |

| gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg gcc gca ctg Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu 545 550 555 | 1679 |
|---|------|
| gtg ccg cgc Val Pro Arg 560 | 1688 |
| <210> 24 <211> 562 <212> PRT <213> Thermus aquaticus | |
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| Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala 1 5 10 15 | |
| Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe 20 25 30 | |
| Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala 35 40 45 | |
| Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala 50 55 60 | |
| Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser 65 70 75 80 | |
| Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro 85 90 95 | |
| Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly 100 105 110 | |
| Val Ala Arg Arg Tyr Gly Glu Glu Trp Thr Glu Glu Ala Gly Glu Arg 115 120 125 | |
| Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu 130 135 140 | |

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Gln Leu Asn Gln Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Asn Lys Leu Lys Ser Thr Gln Ile Thr Gln Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Gln Thr Gly Arg Leu Ser Ser Ser Gln Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Thr Phe Ile Ala Glu Glu Gly Arg Leu Leu Val Ala Leu Asp Tyr Asn Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile

| WO 2005/083068 | PCT/IB2005/000734 |
|----------------|-------------------|
| | |

340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Arg Tyr Leu Pro Asp Leu Glu Ala Gln Val Lys Asn Val Arg 450 455 460

Glu Ala Ala Glu Arg Arg Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val 530 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val 545 550 560

Pro Arg

| | <21 <21 | 10> 11> 12> 13> | 25 1688 DNA The | | aqua | aticu | ıs | | | | | | | | | | |
|---|-------------------|--------------------------|--------------------------|-------------------|-------------------|------------------|------------------|------------|-------------------|-------------------|------------------|---------------------|------------|-------------------|-------------------|------------------|-----|
| | <22 <22 <22 | 21> | CDS (3). | .(16 | S88) | | | | | | | | | | | | |
| | | atg | | | | | | | | | | ggt Gly | | | | | 47 |
| | | | | | | | | | | | | | | | | ggc | 95 |
| | ttt Phe | gtg Val | ctt Leu | tcc Ser 35 | cgc Arg | aag Lys | gag Glu | ccc Pro | atg Met 40 | tgg Trp | gcc Ala | gat A <i>s</i> p | ctt Leu | ctg Leu 45 | gcc Ala | ctg Leu | 143 |
| | | | | | | | | | | | | ccc Pro | | | | | 191 |
| | gcc Ala | ctc Leu 65 | agg Arg | gac Asp | ctg Leu | aag Lys | gag Glu 70 | gcg Ala | cgg Arg | Gly aaa | ctt Leu | ctc Leu 75 | gcc Ala | aaa Lys | gac Asp | ctg Leu | 239 |
| | agc Ser 80 | gtt Val | ctg Leu | gcc Ala | ctg Leu | agg Arg 85 | gaa Glu | ggc Gly | ctt Leu | ggc Gly | ctc Leu 90 | ccg Pro | ccc Pro | ggc Gly | gac Asp | gac Asp 95 | 287 |
| | ccc Pro | atg Met | ctc Leu | ctc Leu | gcc Ala 100 | tac Tyr | ctc Leu | ctg Leu | gac Asp | cct Pro 105 | tcc Ser | aac Asn | acc Thr | acc Thr | ccc Pro 110 | gag Glu | 335 |
| (| gjy aaa | gtg Val | gcc Ala | cgg Arg 115 | cgc Arg | tac Tyr | ggc | ggg Gly | gag Glu 120 | tgg Trp | acg Thr | gag Glu | gag Glu | gcg Ala 125 | ggg Gly | gag Glu | 383 |

| cgg Arg | g gcc | gco Ala 130 | a Lev | tco Sei | c gaç c Glu | g agg L Arg | cto Leu 135 | ı Phe | gcc Ala | aac Asn | cto Lev | g tgg ı Trp 140 | Gly | g ago Z Aro | g ctt g Leu | 431 |
|-------------------|-------------------|-------------------|------------|-------------------|-------------------|-------------------|-------------------|------------|-------------------|-------------------|-------------------|-----------------------|----------------|-------------------|-------------------|------|
| gag Glu | ggg Gly 145 | glu Glu | gag Glu | agg Arg | g ctc g Leu | ctt Leu 150 | Trp | ctt Leu | tac Tyr | : cgg | gag Glu 155 | ı Val | g gag . Glu | agg Arg | g ccc g Pro | 479 |
| ctt Leu 160 | Ser | gct Ala | gtc Val | ctg Leu | gcc Ala 165 | His | atg Met | gag Glu | gcc Ala | acg Thr 170 | Gly | gtg Val | g cgc . Arg | cto Leu | gac Asp 175 | 527 |
| gtg Val | gcc Ala | tat Tyr | ctc Leu | agg Arg 180 | Ala | ttg Leu | tcc Ser | ctg Leu | gag Glu 185 | gtg Val | gcc Ala | gag Glu | gag Glu | atc Ile 190 | gcc Ala | 575 |
| | | | | | | | | | | | | | | | ctc Leu | 623 |
| | | | | | | | | | ctc Leu | | | | | | | 671 |
| ccc Pro | gcc Ala 225 | atc Ile | ggc Gly | aag Lys | acg Thr | gag Glu 230 | aag Lys | acc Thr | ggc Gly | aag Lys | cgc Arg 235 | tcc Ser | acc Thr | agc Ser | gcc Ala | 719 |
| | | | | | | | | | cac His | | | | | | | 767 |
| | | | | | | | | | aag Lys 265 | | | | | | | 815 |
| | | | | | | | | | ggc Gly | | | | | | | 863 |
| | | | | | | Thr | | | cta Leu | | | | | | | 911 |
| Leu | cag Gln 305 | aac Asn | atc Ile | ccc Pro | Val | cgc Arg 310 | acc Thr | ccg Pro | ctt Leu | Gly | cag Gln 315 | agg Arg | atc Ile | cgc Arg | cgg Arg | 959 |
| gcc Ala 320 | ttc Phe | atc Ile | gcc Ala | Glu | gag Glu 325 | ggg Gly | tgg Trp | cta Leu | ttg Leu | gtg Val 330 | gcc Ala | ctg Leu | gac Asp | tat Tyr | agc Ser 335 | 1007 |

| | | | | | Val | | | | | Ser | | | | | ctg Leu | 1055 |
|-----|-----|-----|-----|-----|-----|---|-----|-----|-----|-----|-------------------|-----|-----|-----|------------|------|
| | | | | Gln | | | | | Ile | | | | | Ala | agc Ser | 1103 |
| | | | Gly | | | | | Ala | | | | | Met | | cgg Arg | 1151 |
| | | Lys | | | | | | | | | ggc Gly 395 | Met | | | cac | 1199 |
| | Leu | | | | | | | | | | gag Glu | | | | | 1247 |
| | | | | | | | | | | | cgg Arg | | | | | 1295 |
| | | | | | | | | | | | gtg Val | | | | | 1343 |
| | | | | | | | | | | _ | cgg Arg | | _ | _ | | 1391 |
| Arg | _ | Ala | - | Glu | Arg | _ | Āla | | | Met | ccc Pro 475 | _ | _ | | | 1439 |
| | | | | | | | | | | | ctc Leu | | | | | 1487 |
| | | | Gly | | | | | | | | cac His | | | | | 1535 |
| | | Ala | | | | | Ālā | | | | gcc Ala | | | | | 1583 |
| | | | | | | | | | | | ccc Pro | | | | | 1631 |

530 535 540

gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg gcc gca ctg 1679
Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Leu
545 550 555

gtg ccg cgc 1688 Val Pro Arg

560

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<211> 562

<212> PRT

<213> Thermus aquaticus

<400> 26

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Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly 100 105 110

Val Ala Arg Arg Tyr Gly Glu Glu Trp Thr Glu Glu Ala Gly Glu Arg 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu

130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu 145 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala 225 230 235

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Arg Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val 530 540

| Gly | Ile | Gly | Glu | Asp | Trp | Leu | Ser | Ala | Lys | Glu | Ala | Ala | Ala | Leu | Val. |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |

Pro Arg

| <21 <21 <21 <21 | 1> | 27 1688 DNA Ther | rmus | aqua | ticu | .s | | | | | | | |
|--------------------------|-----|---------------------------|-------------------|------|------|----|---|------|---|---|---|------------|-----|
| <22 <22 <22 | 1> | CDS (3). | .(16 | 88) | | | | | | | | | |
| | atg | | tct Ser | Gly | | | | Gly | | | | | 47 |
| | | | | | | | | | | | | ggc | 95 |
| | | | | | | | | | | | | ctg Leu | 143 |
| | | _ | agg Arg | | | | _ | | _ | | | | 191 |
| | | | gac Asp | | _ | | | | | _ | _ | _ | 239 |
| | | | gcc Ala | | | | | | | | | | 287 |
| | | | ctc Leu | | | | | | | | | | 335 |
| | | | cgg Arg 115 | | | | | | | | | | 383 |

| | | | | a Let | | | | | ı Phe | | | | | Gly | | g ctt g Leu | 431 |
|----|------------|-------------------|------------|------------|------------|----------------|-------------------|------------|------------|------------|------------|-------------------|-------------------|----------------|------------|-------------------|------|
| | gag Glu | ggg Gly 145 | Glu Glu | gag Glu | ago Aro | g cto g Leu | ctt Leu 150 | Trp | ctt Leu | tac Tyr | : cgg | gag Glu 155 | ı Val | g gag . Glu | agg Arg | g ccc g Pro | 479 |
| | | Ser | | | | | His | | | | | Gly | | | | gac Asp 175 | 527 |
| | | | | | | Ala | | | | | | | | | | gcc Ala | 575 |
| | | | | | | | | | | | | | ccc Pro | | | | 623 |
| | | | | _ | _ | _ | _ | | _ | | | | gag Glu 220 | Leu | | | 671 |
| | | | | | | | | | | | | | tcc Ser | | | | 719 |
| • | | | | | | | | | | | | | gtg Val | | | | 767 |
| | | | | | | | | _ | - | _ | _ | | tac Tyr | | _ | | 815 |
| | | | | | | | | | | | | | cac His | | | | 863 |
| | | | | | | | Thr | | | | | | tcc Ser 300 | | | | 911 |
| I | ₋eu | cag Gln 305 | aac Asn | atc Ile | ccc Pro | gtc Val | cgc Arg 310 | acc Thr | ccg Pro | ctt Leu | GJÀ aaa | cag Gln 315 | agg Arg | atc Ile | cgc Arg | cgg Arg | 959 |
| Ç. | ıcc | ttc Phe | atc Ile | gcc Ala | gag Glu | gag Glu | ggg ggg | tgg Trp | cta Leu | ttg Leu | gtg Val | gcc Ala | ctg Leu | gac Asp | tat Tyr | agc Ser | 1007 |

| 320 | ı | | | | 325 | i | | | | 330 |) | | | | 335 | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------------|-----|-----|-----|-----|-----|------|
| | | | | | Val | | | | | tcc Ser | | | | | Leu | 1055 |
| | | | | Gln | _ | | | _ | Ile | cac His | _ | | | Àla | _ | 1103 |
| | | | Gly | | | | | | | gac Asp | | | Met | _ | | 1151 |
| | | Lys | | | | | | | | tac Tyr | | Met | | | | 1199 |
| | | | | | | | | | | gag Glu 410 | | | | | | 1247 |
| | | | | | | | | | | gtg Val | | | | | | 1295 |
| | | | | | | | | | | tac Tyr | | | | | | 1343 |
| | | | | | | | | | - | gcc Ala | | | _ | _ | | 1391 |
| | | | | | | - | | | | atg Met | | _ | _ | | | 1439 |
| | | | | | | | | | | aag Lys 490 | | | | | | 1487 |
| | | | | | | | | | | gtc Val | | | | | | 1535 |
| | | | | | | | | | | gtg Val | | | | | | 1583 |
| gag | gtc | atg | gag | ggg | gtg | tat | ccc | ctg | gcc | gtg | ccc | ctg | gag | gtg | gag | 1631 |

Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu gtg ggg ata ggg gac cgg ctc tcc gcc aag gag gcg gcc gca ctg Val Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Leu ata cca cac Val Pro Arg <210> <211> <212> PRT <213> Thermus aquaticus <400> Met Ala Ser Gly Gly Gly Gly Gly Gly Gly Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu GLy Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Val Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu 27 0 Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pr○ Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380

Ala Lys Ser Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gl
n Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gl
n Ala Phe Ile 405 $$ 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Ser Pro Arg Leu Glu
485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val 530 540

| Gly | Ile | Gly | Glu | Asp | Arg | Leu | Ser | Ala | Lys | Glu | Ala | Ala | Ala | Leu | Val |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |

Pro Arg

| <21 <21 <21 <21 | 1> 2> | 29 1688 DNA Ther | | aqua | ticu | , s | | | | | | | | | |
|--------------------------|----------|---------------------------|------|-------------------|------|--------|---|------|---|---|---|---|---|------------|-----|
| <22 <22 <22 | 1> | CDS (3). | .(16 | 88) | | | | | | | | | | | |
| 1 | atg | | | ggt Gly | | | | Gly | | | | | | | 47 |
| | | | | gcc Ala 20 | | | | | | | | | | Gly | 95 |
| | | | | cgc Arg | - | | | | _ | _ | | _ | _ | _ | 143 |
| _ | _ | _ | | | | | _ | | - | | | | | aaa Lys | 191 |
| - | | | _ | ctg Leu | _ | | | | | | _ | | _ | _ | 239 |
| | _ | _ | - | ctg Leu | | _ | | | | _ | | | _ | | 287 |
| | | | | gcc Ala 100 | | | | | | | | | | gag Glu | 335 |
| | | | | cgc Arg | | | | | | | | | | gag Glu | 383 |

| | 115 | 120 | 1 | 25 | |
|---------------------------------------|---|-------------------------------------|---|---------------------------------|------|
| cgg gcc gcc Arg Ala Ala 130 | ctt tcc gag a Leu Ser Glu A | gg ctc ttc c cg Leu Phe A 135 | gcc aac ctg tgg g Ala Asn Leu Trp G 140 | gg agg ctt ly Arg Leu | 431 |
| gag ggg gag Glu Gly Glu 145 | gag agg ctc c Glu Arg Leu Le 1 | eu Trp Leu I | cac cgg gag gtg g Tyr Arg Glu Val G 155 | ag agg ccc lu Arg Pro | 479 |
| ctt tcc gct Leu Ser Ala 160 | gtc ctg gcc ca Val Leu Ala H: 165 | ıc atg gag g .s Met Glu A | gcc acg ggg gtg c Ala Thr Gly Val A 170 | gc ctg gac rg Leu Asp 175 | 527 |
| gtg gcc tat Val Ala Tyr | ctc agg gcc tt Leu Arg Ala Le 180 | u Ser Leu G | gag gtg gcc gag g Glu Val Ala Glu G 85 | ag atc gcc lu Ile Ala 190 | 575 |
| Arg Leu Glu | | | cc ggc cac ccc t la Gly His Pro Pl 20 | | 623 |
| | | | tc ttt gac gag c eu Phe Asp Glu Le 220 | | 671 |
| ccc gcc atc Pro Ala Ile 225 | ggc aag acg ga Gly Lys Thr Gl 23 | u Lys Thr G | gc aag cgc tcc ac ly Lys Arg Ser Th 235 | cc agc gcc nr Ser Ala | 719 |
| | | | ac ccc atc gtg ga is Pro Ile Val Gl 250 | | 767 |
| | | r Lys Leu Ly | ag agc acc tac at ys Ser Thr Tyr Il 65 | | 815 |
| Leu Pro Asp 1 | ctc atc cac cc Leu Ile His Pr 275 | c agg acg go o Arg Thr Gl 280 | gc cgc ctc cac ac Ly Arg Leu His Th 28 | r Arg Phe | 863 |
| aac cag acg o Asn Gln Thr V 290 | gtc acg gcc ac Val Thr Ala Th | g ggc agg ct Gly Arg Le 295 | a agt agc tcc ga au Ser Ser Ser As 300 | t ccc aac p Pro Asn | 911 |
| ctc cag aac a Leu Gln Asn I 305 | atc ccc gtc cgo Ele Pro Val Arg 310 | Thr Pro Le | et ggg cag agg at eu Gly Gln Arg Il 315 | c cgc cgg e Arg Arg | 959 |
| gcc ttc atc g | scc gag gag ggg | tgg cta tt | g gtg gcc ctg ga | c tat agc | 1007 |

| Al 32 | a Ph O | ne I. | le A | la (| Glu | ·Gl: | u Gl 5 | y Tr | îp Le | eu | Leı | ı Va 33 | il A | Ala | Le | u As | sp | Туз | Ser 335 | |
|-------------------|-----------------------|-----------------------|----------------------|------------------|-------------------|-------------------|-------------------|----------------------|--------------------|----------------|-------------------|-------------------|-------------|----------------|-------------------|--------------------|------------------|-------------------|-------------------|------|
| ca Gl | g at n Il | a ga .e G <u>.</u> | ag c Lu L | eu A | agg Arg 840 | gto Va | g ct L Le | g gc u Al | c ca a Hi | LS | cto Leu 345 | ı Se | c g r G | gly | gad | c ga o Gl | u 🕹 | aac Asn 350 | ctg Leu | 1055 |
| at Il | c cg e Ar | g gt g Va | c t al Pl 3! | ne G | ag Sln | gaç | a Gl | g cg y Ar | g ga g As 36 | q | atc Ile | c ca e Hi | са s T | .cg hr | gaç Glu | g ac ı Th 36 | r Z | gcc Ala | agc Ser | 1103 |
| tg: Tr] | g at o Me | g tt t Ph 37 | ie GJ | yc g | tc | ccc | c cgg | g ga g Gl: 37. | u Al | c a | gtg Val | ga Ası | C C O P: | cc ro | ctg Leu 380 | ı Me | gc t <i>z</i> | cgc Arg | cgg Arg | 1151 |
| gco Ala | g gco a Ala 38! | а ьу | g ac s Th | c a ır I | tc le | aac Asn | tto Phe 390 | : Gly | g gt y Va | с (1] | ctc Leu | tac Tyı | G. | gc ly 95 | atg Met | tc: Se: | g g r A | gcc Ala | cac His | 1199 |
| cgc Arg 400 | тег | c tc ı Se | c ca r Gl | g g n G | Lu | cta Leu 405 | gcc Ala | ato Ile | c cc e Pro | t t | cac Tyr | gag Glu 410 | ı G] | ag Lu | gcc Ala | caç Glr | 9 1 A | cc la | ttc Phe 415 | 1247 |
| att Ile | gag Glu | g cg | c ta g Ty | r Pi | tt ne 20 | cag Gln | agc Ser | ttc Phe | c cc | o I | aag Lys 125 | gtg Val | r cg Ar | .g 3g | gcc Ala | tgg Trp | I | tt le 30 | gag Glu | 1295 |
| aag Lys | acc Thr | cto Lei | g ga u Gl: 43. | J GJ | ag (| ggc | agg Arg | agg Arg | cgg Arg 440 | j G | gly Igg | tac Tyr | gt Va | g il | gag Glu | acc Thr 445 | L€ | tc eu | ttc Phe | 1343 |
| Gly | cgc Arg | ago Arg 450 | Arg | c ta g Ty | ıc ç r T | gtg /al | cca Pro | gac Asp 455 | cta Leu | ı g | ag lu | gcc Ala | cg Ar | g 7 | gtg Val 460 | aag Lys | aç S∈ | gc er | gtg Val | 1391 |
| cgg Arg | gag Glu 465 | gcg Ala | gco Ala | ga Gl | g c u A | cgc Arg | atg Met 470 | gcc Ala | tac Tyr | a. A. | ac sn | atg Met | Pro | 7 0 | gtc Val | cag Gln | g⊆ G 1 | -À àc | acc Thr | 1439 |
| gcc Ala 480 | gcc Ala | gac Asp | cto Leu | at Me | t L | ag ys 85 | ctg Leu | gct Ala | atg Met | gt Vä | al : | aag Lys 490 | cto | c t u E | ctc Phe | ccc Pro | aç Ar | g : | ctg Leu 495 | 1487 |
| gag Glu | gaa Glu | atg Met | Gly | gc Ala 500 | a A | gg rg 1 | atg Met | ctc Leu | ctt Leu | Ca G1 50 | ln 7 | gtc Val | cac His | c g | ac (| gag Glu | ct Le 51 | u v | gtc Val | 1535 |
| ctc Leu | gag Glu | gcc Ala | cca Pro 515 | aaa Lys | ag GG | ag q lu (| ggg Gly | gcg Ala | gag Glu 520 | gc | ec g .a V | gtg /al | gcc Ala | c c | rg] | ctg Leu 525 | gc Al | c a a I | aag Lys | 1583 |

| | | | : Glu | | | | | Leu | | | | | | | gag Glu | 1631 |
|--------------------------|-----------|--------------------------|------------|-----------|-----------|-----------|------------|------------|-----------|-----------|-----------|------------|------------|-----------|------------|------|
| | | ' Ile | | | | | Leu | | | | | Ala | | | ctg Leu | 1679 |
| | Pro | cgc Arg | | | | | | | | | | | | | | 1688 |
| <21 <21 <21 <21 | 1> 2> | 30 562 PRT Ther | mus (| aqua | ticu | S | | | | | | | | | | |
| <40 | 0> | 30 | | | | | | | | | | | | | | |
| Met 1 | Ala | Ser | Gly | Gly 5 | Gly | Gly | Cys | Gly | Gly 10 | Gly | Gly | Ser | Pro | Lys 15 | Ala | |
| Leu | Glu | Glu | Ala 20 | Pro | Trp | Pro | Pro | Pro 25 | Glu | Gly | Ala | Phe | Val 30 | Gly | Phe | |
| Val | Leu | Ser 35 | Arg | Lys | Glu | Pro | Met 40 | Trp | Ala | Asp | Leu | Leu 45 | Ala | Leu | Ala | |
| Ala | Ala 50 | Arg | Gly | Gly | Arg | Val 55 | His | Arg | Ala | Pro | Glu 60 | Pro | Tyr | Lys | Ala | |
| Leu 65 | Arg | Asp | Leu | Lys | Glu 70 | Ala | Arg | Gly | Leu | Leu 75 | Ala | Lys | Asp | Leu | Ser 80 | |
| Val | Leu | Ala | Leu | Arg 85 | Glu | Gly | Leu | Gly | Leu 90 | Pro | Pro | Gly | Asp | Asp 95 | Pro | |
| Met | Leu | Leu | Ala 100 | Tyr | Leu | Leu | | Pro 105 | Ser | Asn | Thr | | Pro 110 | Glu | Gly | |
| Val | Ala | Arg 115 | Arg | Tyr | Gly | | Glu 120 | Trp | Thr | Glu | | Ala 125 | Gly | Glu | Arg | |

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Val Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350

- Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365
- Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 380
- Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400
- Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415
- Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430
- Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445
- Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460
- Glu Ala Ala Glu Arg Met Ala Tyr Asn Met Pro Val Gln Gly Thr Ala 465 470 475 480
- Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495
- Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510
- Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 520 525
- Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val

530 535 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val 545 550 560

Pro Arg

| | | 31 1688 DNA Ther | | aqua | ıticu | ıs | | | | | | | | | | |
|-------------------|------------|---------------------------|------------|-------------------|------------------|------------|------------|------------|-------------------|------------------|------------|------------|------------|-------------------|------------------|-----|
| <22 <22 <22 | 1> | CDS (3). | .(16 | 88) | | | | | | | | | | | | |
| | atg | 31 gcc Ala | | | | | | | | | | | | | | 47 |
| | | | | | | | | | | | | | | | ggc | 95 |
| | | | | | | | | | | | | | | | ctg Leu | 143 |
| | | gcc Ala 50 | | | | | | | | | | | | | aaa Lys | 191 |
| | | agg Arg | | | | | | | | | | | | | | 239 |
| agc Ser 80 | gtt Val | ctg Leu | gcc Ala | ctg Leu | agg Arg 85 | gaa Glu | ggc Gly | ctt Leu | ggc Gly | ctc Leu 90 | ccg Pro | ccc Pro | ggc Gly | gac Asp | gac Asp 95 | 287 |
| ccc Pro | atg Met | ctc Leu | ctc Leu | gcc Ala 100 | tac Tyr | ctc Leu | ctg Leu | gac Asp | cct Pro 105 | tcc Ser | aac Asn | acc Thr | acc Thr | ccc Pro 110 | gag Glu | 335 |
| aaa | gtg | gcc | cgg | cgc | tac | ggc | aaa | gag | tgg | acg | gag | gag | gcg | ggg | gag | 383 |

| Gly | Val | Ala | Arg 115 | _ | Tyr | Gly | Gly | Glu 120 | Trp | Thr | Glu | Glu | Ala 125 | | Glu | |
|-----|-------------------|-----|------------|---|-----|-----|-----|------------|-----|-----|-----|-----|------------|---|-----|-----|
| | gcc Ala | | Leu | | | - | | | _ | | _ | | | | | 431 |
| | ggg Gly 145 | | | | | | | | | | | | | | | 479 |
| | tcc Ser | | _ | - | _ | | - | | - | _ | | | - | _ | _ | 527 |
| | gcc Ala | | | | _ | _ | | _ | | | | | | | | 575 |
| | ctc Leu | | | | | | | | | | | | | | | 623 |
| | tcc Ser | | | | | | | | | | | | | | | 671 |
| | gcc Ala 225 | | | _ | - | - | - | | | | | | | | _ | 719 |
| | gtc Val | | | | | | | | | | | | | | | 767 |
| _ | cag Gln | | | _ | | | - | _ | _ | _ | | | | - | | 815 |
| _ | ccg Pro | _ | | | | | | _ | | | | | | _ | | 863 |
| | cag Gln | _ | _ | _ | _ | Thr | | | | _ | _ | | _ | | | 911 |
| | cag Gln 305 | | | | - | _ | | - | | | _ | | | _ | | 959 |

| Phe | | | | Gly | | | | Āla | | | | agc Ser 335 | 1007 |
|-----|-------------------|------|-----|-----|---------|-----|-----|-----|---|-----|-----|-------------------|------|
| | | | Val | | | | Ser | | | | | ctg Leu | 1055 |
| | | Gln | | | | Ile | | | | | Ala | agc Ser | 1103 |
| | | | | | Āla | | _ | | _ | Met | _ | cgg Arg | 1151 |
| | aag Lys | | | | | | | | | | | | 1199 |
| Leu | tcc Ser | | | | | | | | | | | | 1247 |
| | cgc Arg | | | | | | | | | | | gag Glu | 1295 |
| | ctg Leu | | | | | | | | | | | | 1343 |
| | cgc Arg 450 | | | | | | | | | | | | 1391 |
| | gcg Ala | | | | | | | | | | | | 1439 |
| | gac Asp | | | | | | | | | | | | 1487 |
| | atg Met | | | | | | | | | | | | 1535 |
| | gcc Ala | | | | | | | | | | | | 1583 |

| gag gtc atg gag ggg gtg tat ccc ctg gcc gtg Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val 530 535 | |
|---|-----------------------------|
| gtg ggg ata ggg gag gac cgg ctc tcc gcc aag Val Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys 545 550 | |
| gtg ccg cgc Val Pro Arg 560 | 1688 |
| <210> 32 <211> 562 <212> PRT <213> Thermus aquaticus | |
| <400> 32 | |
| Met Ala Ser Gly Gly Gly Gly Cys Gly Gly 1 5 10 | Gly Ser Pro Lys Ala 15 |
| Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly . 20 25 | Ala Phe Val Gly Phe 30 · |
| Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp 35 40 | Leu Leu Ala Leu Ala 45 |
| Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro 6 | Glu Pro Tyr Lys Ala 60 |
| Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu A | Ala Lys Asp Leu Ser 80 |
| Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro E 85 90 | Pro Gly Asp Asp Pro 95 |
| Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn 1 | Thr Thr Pro Glu Gly 110 |
| Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu G | Glu Ala Gly Glu Arg 125 |

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu 145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln

325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val 530 535 540 Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Ala Leu Val 545 550 555 560 Pro Arg <210> 33 <211> 1688 <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (3)...(1688)<400> 33 cc atg gcc tct ggt ggc ggt ggc tgt ggc ggt ggc agc ccc aag 47 Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Ser Pro Lys 1 10 15 gcc ctg gag gag gcc ccc tgg ccc ccg ccg gaa ggg gcc ttc gtg ggc 95 Ala Leu Glu Glu Ala Pro Trp Pro Pro Glu Gly Ala Phe Val Gly ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt ctg gcc ctg 143 Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu 35 40 45 gcc gcc gcc agg ggg ggc cgg gtc cac cqq qcc ccc qaq cct tat aaa 191 Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys 50 55 gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc aaa gac ctg 239 Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu 65 75 age gtt etg gee etg agg gaa gge ett gge ete eeg eee gge gae gae 287 Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp 80 85 90 95 ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc ccc gag 335 Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu

105

110

| ggg Gly | g gto Val | g gcc Ala | cgg Arg 115 | , Arg | tac Tyr | ggc Gly | . GJ? : aač | g gag Glu 120 | ı Trp | g acq | g gag r Glu | g gaç ı Glu | g gcg Ala 125 | ı Gly | ggag Glu | 383 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|-------------------|-------------------|---------------------|-------------------|---------------------|-------------------|-------------------|-----|
| cgg Arg | gcc Ala | gcc Ala 130 | Leu | tcc Ser | gag Glu | agg Arg | cto Leu 135 | . Phe | gcc Ala | : aad Asr | c ctg n Leu | tgg Trp 140 | Gly | agg Arg | ctt Leu | 431 |
| gag Glu | ggg Gly 145 | gag Glu | gag Glu | agg Arg | ctc Leu | ctt Leu 150 | Trp | ctt Leu | tac Tyr | cgc Arc | g gag Glu 155 | . Val | gag Glu | agg Arg | ccc | 479 |
| ctt Leu 160 | Ser | gct Ala | gtc Val | ctg Leu | gcc Ala 165 | cac His | atg Met | gag Glu | gcc Ala | acg Thr 170 | Gly | gtg Val | cgc Arg | ctg Leu | gac Asp 175 | 527 |
| gtg Val | gcc Ala | tat Tyr | ctc Leu | agg Arg 180 | gcc Ala | ttg Leu | tcc Ser | ctg Leu | gag Glu 185 | gtg Val | gcc Ala | gag Glu | gag Glu | atc Ile 190 | gcc Ala | 575 |
| | | gag Glu | | | | | | | | | | | | | | 623 |
| | | cgg Arg 210 | | | | | | | | | | | | | | 671 |
| ccc Pro | gcc Ala 225 | atc Ile | ggc | aag Lys | acg Thr | gag Glu 230 | aag Lys | acc Thr | ggc Gly | aag Lys | cgc Arg 235 | tcc Ser | acc Thr | agc Ser | gcc Ala | 719 |
| gcc Ala 240 | gtc Val | ctg Leu | gag Glu | gcc Ala | ctc Leu 245 | cgc Arg | gag Glu | gcc Ala | cac His | ccc Pro 250 | atc Ile | gtg Val | gag Glu | aag Lys | atc Ile 255 | 767 |
| ctg Leu | cag Gln | tac Tyr | cgg Arg | gag Glu 260 | ctc Leu | acc Thr | aag Lys | ctg Leu | aag Lys 265 | agc Ser | acc Thr | tac Tyr | att Ile | gac Asp 270 | ccc Pro | 815 |
| ttg Leu | ccg Pro | gac Asp | ctc Leu 275 | atc Ile | cac His | ccc Pro | agg Arg | acg Thr 280 | ggc Gly | cgc Arg | ctc Leu | cac His | acc Thr 285 | cgc Arg | ttc Phe | 863 |
| aac Asn | Gln | acg Thr 290 | gcc Ala | acg Thr | gcc Ala | Thr | ggc Gly 295 | agg Arg | cta Leu | agt Ser | Ser | tcc Ser 300 | gat Asp | ccc Pro | aac Asn | 911 |
| Leu | cag Gln 305 | aac Asn | atc Ile | ccc Pro | Val . | cgc Arg 310 | acc Thr | ccg Pro | ctt Leu | Gly ggg | cag Gln 315 | agg Arg | atc Ile | cgc Arg | cgg Arg | 959 |

| gco Ala 320 | a Phe | c ato e Ile | c gco Ala | c gaq a Gli | g gag ı Glu 325 | ı Gly | g tgg y Trp | g cta D Lei | a tto ı Leo | g gto 1 Va 330 | l Ala | c ct a Le | g ga u As | c ta p Ty | t agc r Ser 335 | 1007 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|---------------------|----------------------|-------------------|---------------------------|-----------------------|-----------------------|-----------------------|------|
| caç Glr | g ata n Ile | a gaç e Glu | g cto Leu | agg Arg 340 | y Val | cto Leu | g gco 1 Ala | cac His | c cto Leu 345 | ı Sei | c ggo r Gly | c ga y As _l | c ga o Gli | g aad 1 Asi 350 | c ctg n Leu) | 1055 |
| ato Ile | cgg Arg | g gtc g Val | tto Phe 355 | Glr | g gag n Glu | Gly ggg | g cgg Ærg | gac Asp 360 |) Ile | cac His | c aco | g gaq Gli | g aco ı Thi 365 | : Ala | c agc a Ser | 1103 |
| tgg Trp | atg Met | ttc Phe 370 | Gly | gto Val | ccc Pro | cgg Arg | gag Glu 375 | Ala | gtg Val | gac Asp | c ccc | cto Lei 380 | ı Met | g cgo : Aro | c cgg g Arg | 1151 |
| gcg Ala | gcc Ala 385 | Lys | acc Thr | atc Ile | aac Asn | ttc Phe 390 | Gly | gtc Val | ctc Leu | tac Tyr | ggc Gly 395 | Met | tco Ser | Ala Ala | cac His | 1199 |
| cgc Arg 400 | ctc Leu | tcc Ser | cag Gln | gag Glu | cta Leu 405 | gcc Ala | atc Ile | cct Pro | tac Tyr | gag Glu '410 | Glu | gcc | cag Gln | gcc Ala | ttc Phe 415 | 1247 |
| att Ile | gag Glu | cgc Arg | tac Tyr | ttt Phe 420 | ctg Leu | agc Ser | ttc Phe | ccc Pro | aag Lys 425 | gtg Val | cgg Arg | gcc Ala | tgg Trp | att Ile 430 | gag Glu | 1295 |
| aag Lys | acc Thr | ctg Leu | gag Glu 435 | gag Glu | ggc Gly | agg Arg | agg Arg | cgg Arg 440 | gly ggg | tac Tyr | gtg Val | gag Glu | acc Thr 445 | ctc Leu | ttc Phe | 1343 |
| ggc Gly | cgc Arg | cgc Arg 450 | cgc Arg | tac Tyr | gtg Val | cca Pro | gac Asp 455 | cta Leu | gag Glu | gcc Ala | cgg Arg | gtg Val 460 | aag Lys | agc Ser | gtg Val | 1391 |
| cgg Arg | gag Glu 465 | gcg Ala | gcc Ala | gag Glu | cgc Arg | aag Lys 470 | gcc Ala | ttc Phe | aac Asn | atg Met | ccc Pro 475 | gtc Val | cag Gln | ggc Gly | acc Thr | 1439 |
| gcc Ala 480 | gcc Ala | gac Asp | ctc Leu | atg Met | aag Lys 485 | ctg Leu | gct Ala | atg Met | gtg Val | aag Lys 490 | ctc Leu | ttc Phe | ccc Pro | agg Arg | ctg Leu 495 | 1487 |
| gag Glu | gaa Glu | atg Met | Gly | gcc Ala 500 | agg Arg | atg Met | ctc Leu | Leu | cag Gln 505 | gtc Val | cac His | gac Asp | gag Glu | ctg Leu 510 | gtc Val | 1535 |
| ctc (Leu (| gag Glu . | gcc Ala | cca Pro | aaa Lys | gag Glu | ggg Gly . | gcg Ala | gag Glu | gcc Ala | gtg Val | gcc Ala | cgg Arg | ctg Leu | gcc Ala | aag Lys | 1583 |

gag gtc atg gag gtg tat ccc ctg gcc gtg ctc ctg gag gtg gag Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Leu Leu Glu Val Glu gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg gcc gca ctg. Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Leu gtg ccg cgc Val Pro Arg , <210> <211> 562 <212> PRT <213> Thermus aquaticus <400> 34 Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly

Val Ala Arg Arg Tyr Gly Glu Glu Trp Thr Glu Glu Ala Gly Glu Arg

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Ala

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Leu Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Glu Ala Ala Glu Arg Lys Ala Phe Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu

| Val Met Glu Gly Val Tyr Pro Leu Ala Val Leu Leu Glu Val Glu Val 530 540 | |
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| Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val 545 550 560 | |
| Pro Arg | |
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| gcc ctg gag gag gcc ccc tgg ccc ccg ccg gaa ggg gcc ttc gtg ggc Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly 20 25 30 | 95 |
| ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt ctg gcc ctg Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu 35 40 45 | 143 |
| gcc gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag cct tat aaa Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys 50 55 60 | 191 |
| gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc aaa gac ctg Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu 65 70 75 | 239 |
| agc gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc ggc gac gac Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp 80 85 90 95 | 287 |
| ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc acc ccc gag Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu 100 105 110 | 335 |

| | | | | | | | | gag Glu 120 | Trp | | | | | | | 383 |
|------------|------------|-------------------|------------|------------|------------|------------|-------------------|-------------------|------------|------------|------------|-------------------|------------|-----|------------|-----|
| | | | | | | | | ttc Phe | | | | | | | | 431 |
| | | | | | | | | ctt Leu | | | | | | | | 479 |
| | | _ | _ | _ | _ | | - | gag Glu | _ | _ | | | | | | 527 |
| | | | | | | | | ctg Leu | | | | | | | | 575 |
| | | | | | | | | ctg Leu 200 | | | | | | | | 623 |
| aac Asn | tcc Ser | cgg Arg 210 | gac Asp | cag Gln | ctg Leu | gaa Glu | agg Arg 215 | gtc Val | ctc Leu | ttt Phe | gac Asp | gag Glu 220 | cta Leu | ggg | ctt Leu | 671 |
| | | | | | | | | acc Thr | | | | | | | | 719 |
| _ | _ | _ | | | | _ | | gcc Ala | | | | | - | _ | | 767 |
| | | | | | | | | ctg Leu | | | | | | | | 815 |
| _ | _ | _ | | | | | _ | acg Thr 280 | | _ | | | | | | 863 |
| | _ | _ | _ | _ | _ | Thr | | agg Arg | | _ | _ | | _ | | | 911 |
| | - | | | | | | | ccg Pro | | | _ | | | | | 959 |

| 305 | 310 | 315 |
|-----|-----|-----|
| | | |

| | | | | cta Leu | | | | | | 1007 |
|-------|---|-------|-------|-------------------|---|---|---|---|--|------|
| | | | | cac His | | | | | | 1055 |
| | | | | gac Asp 360 | | | | | | 1103 |
| | | | | gcc Ala | | | | | | 1151 |
| | | | | gtc Val | | | | | | 1199 |
| | | | | cct Pro | | | | | | 1247 |
| | | | | ccc Pro | | | | | | 1295 |
| | | | | cgg Arg 440 | | | | | | 1343 |
| | | | | cta Leu | | | | | | 1391 |
| | | | | tac Tyr | | | | | | 1439 |
| | | | | atg Met | | | | | | 1487 |
| - | _ | _ | _ | ctt Leu | _ | _ | _ | _ | | 1535 |

ctc gag gcc cca aaa gag ggg gcg gag gcc gtg gcc cgg ctg gcc aag 1583

| Leu | Glu | . Ala | Pro 515 | | s Glu | ı Gly | Ala | Glu 520 | | ı Val | Ala | Arg | Leu 525 | | Lys | |
|------------------------------|--------------|--------------------------|------------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|------------|-----------|------------|------|
| | | | Glu | | | | | Leu | | | | | Glu | | gag Glu | 1631 |
| | | Ile | | | | | | | | | | Ala | | | ctg Leu | 1679 |
| gtg Val 560 | _ | _ | | | | | | | | | | | | | | 1688 |
| <210 <211 <212 <213 | .> . :> : | 36 562 PRT Iher | mus , | aqua | ticu | S | | | | | | | | | | |
| <400 | > : | 36 | | | | | | | | | | | | | | |
| Met . 1 | Ala | Ser | Gly | Gly 5 | Gly | Gly | Cys | Gly | Gly 10 | Gly | Gly | Ser | Pro | Lys 15 | Ala | |
| Leu | Glu | Glu | Ala 20 | Pro | Trp | Pro | Pro | Pro 25 | Glu | Gly | Ala | Phe | Val 30 | Gly | Phe | |
| Val : | Leu | Ser 35 | Arg | Lys | Glu | Pro | Met 40 | Trp | Ala | Asp | Leu | Leu 45 | Ala | Leu | Ala | |
| Ala A | Ala 50 | Arg | Gly | Gly | Arg | Val 55 | His | Arg | Ala | Pro | Glu 60 | Pro | Tyr | Lys | Ala | |
| Leu <i>1</i> 65 | Arg | Asp | Leu | Lys | Glu 70 | Ala | Arg | Gly | Leu | Leu 75 | Ala | Lys | Asp | Leu | Ser 80 | |
| Val I | Ŀeu | Ala | Leu | Arg 85 | Glu | Gly | Leu | Gly | Leu 90 | Pro | Pro | Gly | Asp | Asp 95 | Pro | |
| Met I | Leu | | Ala 100 | Tyr | Leu | Leu . | | Pro 105 | Ser | Asn | Thr | Thr | Pro 110 | Glu | Gly | |

Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Gln Asp Leu Ile His Pro Ser Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Glu Arg Glu Ala Ala Glu Arg Met Ala Tyr Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu

| Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Ala Glu Val 530 535 540 | |
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| Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val 545 550 560 | |
| Pro Arg | |
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| gcc ctg gag gag gcc ccc tgg ccc ccg ccg gaa ggg gcc ttc gtg ggc Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly 20 25 30 | 95 |
| ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt ctg gcc ctg Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu 35 40 45 | 143 |
| gcc gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag cct tat aaa Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys 50 55 60 | 191 |
| gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc aaa gac ctg Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu 65 70 75 | 239 |
| age gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc ggc gac gac Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp 80 85 90 95 | 287 |
| ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc acc ccc gag Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu | 335 |

100 105 110

| Gly ggg | gtg Val | gcc Ala | cgg Arg 115 | Arg | tac Tyr | ggc | gly ggg | gag Glu 120 | Trp | acg Thr | gag Glu | gag Glu | gcg Ala 125 | Gly | gag Glu | 383 |
|------------|------------|------------|-------------------|------------|------------|--------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|-----|
| | | | Leu | | | | | Phe | | | | | GJÀ aaa | | ctt Leu | 431 |
| | | Glu | | | | | | | | | | Val | gag Glu | | | 479 |
| | | | | | | | | | | | | | cgc Arg | | | 527 |
| | | | | | | | | | | | | | gag Glu | | | 575 |
| | | | | | | | | | | | | | ttc Phe 205 | | | 623 |
| | | | | | | | | | | | | | cta Leu | | | 671 |
| | | | | | | | | | | | | | acc Thr | | | 719 |
| | | | | Ala | | | | | | | | | gag Glu | | | 767 |
| | | | Arg | | | | | Leu | | | | | att Ile | | | 815 |
| ttg Leu | ccg Pro | Asp | ctc Leu 275 | atc Ile | cac His | ccc Pro . | Arg | acg Thr 280 | ggc Gly | cgc Arg | ctc Leu | His | acc Thr 285 | cgc Arg | ttc Phe | 863 |
| aac Asn | Gln | | | | | Thr | | | | | Ser | | | | | 911 |
| ctc | cag | aac | atc (| ccc (| gtc (| cgc : | acc | ccg | ctt | ggg | cag | agg (| atc | cgc | cgg | 959 |

| Leu | Gln 305 | | ıle | e Pro | val | Arg 310 | | Pro | Leu | ı Gly | Glr 315 | | ·Ile | Arg | Arg | |
|-----|------------|---|-----|-------|-----|------------|---|-----|-----|-------|------------|-------------------|------|-----|----------------------------|------|
| | Phe | | | | | Gly | | | | | Āla | | | | agc Ser 335 | 1007 |
| | | | | | Val | | | | | Ser | | | | | ctg Leu | 1055 |
| | | | | Gln | | | | | Ile | | | | | | agc Ser | 1103 |
| | | | | | | | | _ | | _ | | - | - | _ | cgg Arg | 1151 |
| | | | | | | | | | | | | | | | cac His | 1199 |
| | | | | | | | | | | | | | | | ttc Phe 4 1 5 | 1247 |
| | | | | | | | | | | | | | | | gag Glu | 1295 |
| | | | | | | | | | | | | | | | ttc Phe | 1343 |
| | | | | | | | - | | | _ | | gtg Val 460 | _ | _ | | 1391 |
| | _ | _ | | | _ | - | | | | - | | gtc Val | _ | | | 1439 |
| | | | | | | | | | | | | ttc Phe | | | | 1487 |
| | | | Gly | | | | | Leu | | | | gac Asp | | | | 1535 |

| | | | | Lys | | | | | gcc Ala | | | | | Ala | | 1583 |
|--------------------------|-----------|---------------------------|------------|-----------|-----------|-----------|-----------|------------|------------|-----------|-----------|-----------|------------|-----------|-----------|------|
| | | | Glu | | | | | Leu | gcc Ala | | | | Glu | | | 1631 |
| | | z Ile | | | | | Leu | | gcc Ala | _ | | Ala | | | | 1679 |
| | Pro | cgc Arg | | | | | | | | | | | | | | 1688 |
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| Met 1 | Ala | Ser | Gly | Gly 5 | Gly | Gly | Cys | Gly | Gly 10 | Gly | Gly | Ser | Pro | Lys 15 | Ala | |
| Leu | Glu | Glu | Ala 20 | Pro | Trp | Pro | Pro | Pro 25 | Glu | Gly | Ala | Phe | Val 30 | Gly | Phe | |
| Val | Leu | Ser 35 | Arg | Lys | Glu | Pro | Met 40 | Trp | Ala | Asp | Leu | Leu 45 | Ala | Leu | Ala | |
| Ala | Ala 50 | Arg | Gly | Gly | Arg | Val 55 | His | Arg | Æla | Pro | Glu 60 | Pro | Tyr | Lys | Ala | |
| Leu 65 | Arg | Asp | Leu | Lys | Glu 70 | Ala | Arg | Gly | Leu | Leu 75 | Ala | Lys | Asp | Leu | Ser 80 | |
| Val | Leu | Ala | Leu | Arg 85 | Glu | Gly | Leu | Gly | Leu 90 | Pro | Pro | Gly | Asp | Asp 95 | Pro | |
| Met | Leu | Leu | Ala 100 | Tyr | Leu | Leu | Asp | Pro 105 | Ser | Asn | Thr | Thr | Pro 110 | Glu | Gly | |

Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro 2.15 Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400

Leu Ser Gl
n Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gl
n Ala Phe Ile 405 $$ 410 $$ 415

Glu Arg Tyr Phe Gln Ser. Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
420 425 430

Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 480

Ala Asp Leu Val Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu

515 520 . 525

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33

60

55

Phe Pro Glu Phe Leu Thr Met Met Ala Arg Lys Met Lys Asp Thr Asp 65 70 75 80

Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg Val Phe Asp Lys Asp Gly 85 90 95

Asn Gly Tyr Ile Ser Ala Ala Glu Leu Arg His Val Met Thr Asn Leu 100 105 110

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Gly Asp Ile Asn Pro Asn Asn Gly Gly Thr Ser Tyr Asn Gln Lys Phe 50 55 60

Lys Gly Arg Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr 65 70 75 80

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Val His Ser Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro
35 40 45

Gly Gln Ser Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser 50 55 60

Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr 65 70 75 80

Leu Lys Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys 85 90 95

Phe Gln Gly Ser His Val Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu 100 105 110

Glu Ile Lys Arg 115

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<400> 50

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Leu Thr Thr Ser Arg Gly Glu Pro Val Gln Ala Val Tyr Gly Phe Ala 35 40 45

Lys Ser Leu Leu Lys Ala Leu Lys Glu Asp Gly Tyr Lys Ala Val Phe 50 55 60

Val Val Phe Asp Ala Lys Ala Pro Ser Phe Arg His Glu Ala Tyr Glu 65 70 75 80

Ala Tyr Lys Ala Gly Arg Ala Pro Thr Pro Glu Asp Phe Pro Arg Gln 85 90 95

- Leu Ala Leu Ile Lys Glu Leu Val Asp Leu Leu Gly Phe Thr Arg Leu 100 105 110
- Glu Val Pro Gly Tyr Glu Ala Asp Asp Val Leu Ala Thr Leu Ala Lys 115 120 125
- Lys Ala Glu Lys Glu Gly Tyr Glu Val Arg Ile Leu Thr Ala Asp Arg 130 135 140
- Asp Leu Tyr Gln Leu Val Ser Asp Arg Val Ala Val Leu His Pro Glu 145 150 155 160
- Gly His Leu Ile Thr Pro Glu Trp Leu Trp Glu Lys Tyr Gly Leu Arg 165 170 175
- Pro Glu Gln Trp Val Asp Phe Arg Ala Leu Val Gly Asp Pro Ser Asp 180 185 190
- Asn Leu Pro Gly Val Lys Gly Ile Gly Glu Lys Thr Ala Leu Lys Leu 195 200 205
- Leu Lys Glu Trp Gly Ser Leu Glu Asn Leu Leu Lys Asn Leu Asp Arg 210 215 220
- Val Lys Pro Glu Asn Val Arg Glu Lys Ile Lys Ala His Leu Glu Asp 225 230 235 240
- Leu Arg Leu Ser Leu Glu Leu Ser Arg Val Arg Thr Asp Leu Pro Leu 245 250 255
- Glu Val Asp Leu Ala Gln Gly Arg Glu Pro Asp Arg Glu Gly Leu Arg 260 265 270
- Ala Phe Leu Glu Arg Leu Glu Phe Gly Ser Leu Leu His Glu Phe Gly 275 280 285

Leu Leu Glu 290

<210> 51

<211> 196

<212> PRT

<213> Escherichia coli

<400> 51

Val Ile Ser Tyr Asp Asn Tyr Val Thr Ile Leu Asp Glu Glu Thr Leu 1 5 10 15

Lys Ala Trp Ile Ala Lys Leu Glu Lys Ala Pro Val Phe Ala Phe Asp 20 25 30

Thr Glu Thr Asp Ser Leu Asp Asn Ile Ser Ala Asn Leu Val Gly Leu 35 40 45

Ser Phe Ala Ile Glu Pro Gly Val Ala Ala Tyr Ile Pro Val Ala His 50 55. 60

Asp Tyr Leu Asp Ala Pro Asp Gln Ile Ser Arg Glu Arg Ala Leu Glu 65 70 75 80

Leu Leu Lys Pro Leu Leu Glu Asp Glu Lys Ala Leu Lys Val Gly Gln 85 90 95

Asn Leu Lys Tyr Asp Arg Gly Ile Leu Ala Asn Tyr Gly Ile Glu Leu 100 105 110

Arg Gly Ile Ala Phe Asp Thr Met Leu Glu Ser Tyr Ile Leu Asn Ser 115 120 125

Val Ala Gly Arg His Asp Met Asp Ser Leu Ala Glu Arg Trp Leu Lys 130 135 140

His Lys Thr Ile Thr Phe Glu Glu Ile Ala Gly Lys Gly Lys Asn Gln 145 150 155 160

Leu Thr Phe Asn Gln Ile Ala Leu Glu Glu Ala Gly Arg Tyr Ala Ala 165 170 175

Glu Asp Ala Asp Val Thr Leu Gln Leu His Leu Lys Met Trp Pro Asp 180 185 190

Leu Gln Lys His 195

<210> 52

<211> 686

<212> PRT

<213> Bacillus circulans

<400> 52

Ala Pro Asp Thr Ser Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val 1 5 10

Ile Tyr Gln Ile Phe Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn 20 25 30.

Asn Pro Thr Gly Ala Ala Phe Asp Gly Thr Cys Thr Asn Leu Arg Leu 35 40 45

Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly 50 55 60

Tyr Leu Thr Gly Met Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val 70 75 80

Glu Asn Ile Tyr Ser Ile Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala 85 90 95

Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr 100 105 110

Gly Thr Ile Ala Asp Phe Gln Asn Leu Ile Ala Ala His Ala Lys 115 120 125

Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala . Ser Ser Asp Gln Pro Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Thr Leu Leu Gly Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Asn Gly Gly Thr Asp Phe Ser Thr Thr Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu Ala Asp Leu Asn His Asn Asn Ser Thr Val Asp Val Tyr Leu Lys Asp Ala Ile Lys Met Trp Leu Asp Leu Gly Ile Asp Gly Ile Arg Met Asp Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ala Ala Val Asn Asn Tyr Lys Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly Val Asn Glu Val Ser Pro Glu Asn His Lys Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ala Gln Lys Val Arg Gln Val Phe Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly Ser Ala Ala Asp Tyr Ala Gln Val Asp Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Glu Arg Phe His Ala Ser Asn

325 330 335

Ala Asn Arg Arg Lys Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser 340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Ser Gly 355 360 365

Gly Thr Asp Pro Asp Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Ser 370 380

Thr Thr Ala Tyr Gln Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Cys 385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Glu Arg Trp Ile Asn Asn 405 410 415

Asp Val Leu Ile Tyr Glu Arg Lys Phe Gly Ser Asn Val Ala Val Val 420 425 430

Ala Val Asn Arg Asn Leu Asn Ala Pro Ala Ser Ile Ser Gly Leu Val 435 440 445

Thr Ser Leu Pro Gln Gly Ser Tyr Asn Asp Val Leu Gly Gly Leu Leu 450 455 460

Asn Gly Asn Thr Leu Ser Val Gly Ser Gly Gly Ala Ala Ser Asn Phe 465 470 475 480

Thr Leu Ala Ala Gly Gly Thr Ala Val Trp Gln Tyr Thr Ala Ala Thr 485 490 495

Ala Thr Pro Thr Ile Gly His Val Gly Pro Met Met Ala Lys Pro Gly 500 505 510

Val Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Ser Ser Lys Gly Thr 515 520 525

Val Tyr Phe Gly Thr Thr Ala Val Ser Gly Ala Asp Ile Thr Ser Trp Glu Asp Thr Gln Ile Lys Val Lys Ile Pro Ala Val Ala Gly Gly Asn Tyr Asn Ile Lys Val Ala Asn Ala Ala Gly Thr Ala Ser Asn Val Tyr Asp Asn Phe Glu Val Leu Ser Gly Asp Gln Val Ser Val Arg Phe Val Val Asn Asn Ala Thr Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly Ser Val Ser Glu Leu Gly Asn Trp Asp Pro Ala Lys Ala Ile Gly Pro Met Tyr Asn Gln Val Val Tyr Gln Tyr Pro Asn Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly Lys Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr Trp Glu Gly Gly Ser Asn His Thr Phe Thr Ala Pro Ser Ser Gly Thr Ala Thr Ile Asn Val Asn Trp Gln Pro <210> <211> <212> PRT <213> Bordetella pertussis <400>

Met Gln Gln Ser His Gln Ala Gly Tyr Ala Asn Ala Ala Asp Arg Glu

Ser Gly Ile Pro Ala Ala Val Leu Asp Gly Ile Lys Ala Val Ala Lys 20 25 30

- Glu Lys Asn Ala Thr Leu Met Phe Arg Leu Val Asn Pro His Ser Thr 35 40 45
- Ser Leu Ile Ala Glu Gly Val Ala Thr Lys Gly Leu Gly Val His Ala 50 55 60
- Lys Ser Ser Asp Trp Gly Leu Gln Ala Gly Tyr Ile Pro Val Asn Pro 65 70 75 80
- Asn Leu Ser Lys Leu Phe Gly Arg Ala Pro Glu Val Ile Ala Arg Ala 85 90 95
- Asp Asn Asp Val Asn Ser Ser Leu Ala His Gly His Thr Ala Val Asp 100 105 110
- Leu Thr Leu Ser Lys Glu Arg Leu Asp Tyr Leu Arg Gln Ala Gly Leu 115 120 125
- Val Thr Gly Met Ala Asp Gly Val Val Ala Ser Asn His Ala Gly Tyr 130 135 140
- Glu Gln Phe Glu Phe Arg Val Lys Glu Thr Ser Asp Gly Arg Tyr Ala 145 150 150 155 160
- Val Gln Tyr Arg Arg Lys Gly Gly Asp Asp Phe Glu Ala Val Lys Val 165 170 175
- Ile Gly Asn Ala Ala Gly Ile Pro Leu Thr Ala Asp Ile Asp Met Phe 180 185 190
- Ala Ile Met Pro His Leu Ser Asn Phe Arg Asp Ser Ala Arg Ser Ser 195 200 205
- Val Thr Ser Gly Asp Ser Val Thr Asp Tyr Leu Ala Arg Thr Arg Arg 210 215 220

Ala Ala Ser Glu Ala Thr Gly Gly Leu Asp Arg Glu Arg Ile Asp Leu Leu Trp Lys Ile Ala Arg Ala Gly Ala Arg Ser Ala Val Gly Thr Glu Ala Arg Arg Gln Phe Arg Tyr Asp Gly Asp Met Asn Ile Gly Val Ile Thr Asp Phe Glu Leu Glu Val Arg Asn Ala Leu Asn Arg Arg Ala His Ala Val Gly Ala Gln Asp Val Val Gln His Gly Thr Glu Gln Asn Asn Pro Phe Pro Glu Ala Asp Glu Lys Ile Phe Val Val Ser Ala Thr Gly Glu Ser Gln Met Leu Thr Arg Gly Gln Leu Lys Glu Tyr Ile Gly Gln • Gln Arg Gly Glu Gly Tyr Val Phe Tyr Glu Asn Arg Ala Tyr Gly Val Ala Gly Lys Ser Leu Phe Asp Asp Gly Leu Gly Ala Ala Pro Gly Val Pro Ser Gly Arg Ser Lys Phe Ser Pro Asp Val Leu Glu Thr Val Pro

Ala Ser Pro Gly Leu Arg Arg Pro Ser Leu Gly Ala Val Glu Arg

<210> 54

<211> 275

<212> PRT

<213> Bacillus amyloliquefaciens

<400> 54

Ala Gln Ser Val Pro Tyr Gly Val Ser Gln Ile Lys Ala Pro Ala Leu 1 5 10 15

- His Ser Gln Gly Tyr Thr Gly Ser Asn Val Lys Val Ala Val Ile Asp 20 25 30
- Ser Gly Ile Asp Ser Ser His Pro Asp Leu Lys Val Ala Gly Gly Ala 35 40 45
- Ser Met Val Pro Ser Glu Thr Asn Pro Phe Gln Asp Asn Asn Ser His 50 55 60
- Gly Thr His Val Ala Gly Thr Val Ala Ala Leu Asn Asn Ser Ile Gly 65 70 75 80
- Val Leu Gly Val Ala Pro Ser Ala Ser Leu Tyr Ala Val Lys Val Leu 85 90 95
- Gly Ala Asp Gly Ser Gly Gln Tyr Ser Trp Ile Ile Asn Gly Ile Glu
 . 100 105 110
- Trp Ala Ile Ala Asn Asn Met Asp Val Ile Asn Met Ser Leu Gly Gly 115 120 125
- Pro Ser Gly Ser Ala Ala Leu Lys Ala Ala Val Asp Lys Ala Val Ala 130 135 140
- Ser Gly Val Val Val Ala Ala Ala Gly Asn Glu Gly Thr Ser Gly 145 150 155 160
- Ser Ser Ser Thr Val Gly Tyr Pro Gly Lys Tyr Pro Ser Val Ile Ala 165 170 175
- Val Gly Ala Val Asp Ser Ser Asn Gln Arg Ala Ser Phe Ser Ser Val 180 185 190
- Gly Pro Glu Leu Asp Val Met Ala Pro Gly Val Ser Ile Gln Ser Thr 195 200 205

Leu Pro Gly Asn Lys Tyr Gly Ala Tyr Asn Gly Thr Ser Met Ala Ser 210 215 220

Pro His Val Ala Gly Ala Ala Ala Leu Ile Leu Ser Lys His Pro Asn 225 230 235 240

Trp Thr Asn Thr Gln Val Arg Ser Ser Leu Glu Asn Thr Thr Lys 245 250 255

Leu Gly Asp Ser Phe Tyr Tyr Gly Lys Gly Leu Ile Asn Val Gln Ala 260 265 270

Ala Ala Gln 275

<210> 55

<211> 182

<212> PRT

<213> Bacillus subtilis

<400> 55

Ala Ala Glu His Asn Pro Val Val Met Val His Gly Ile Gly Gly Ala 1 5 10 15

Ser Phe Asn Phe Ala Gly Ile Lys Ser Tyr Leu Val Ser Gln Gly Trp 20 25 30

Ser Arg Asp Lys Leu Tyr Ala Val Asp Phe Trp Asp Lys Thr Gly Thr 35 40 45

Asn Tyr Asn Asn Gly Pro Val Leu Ser Arg Phe Val Gln Lys Val Leu 50 60

Asp Glu Thr Gly Ala Lys Lys Val Asp Ile Val Ala His Ser Met Gly 65 70 75 80

Gly Ala Asn Thr Leu Tyr Tyr Ile Lys Asn Leu Asp Gly Gly Asn Lys 85 90 95

| Val | Ala | Asn | Val | Val | Thr | Leu | Gly | Gly | Ala | Asn | Arg | Leu | Thr | Thr | Gly |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | 100 | | | | | 105 | | | | | 110 | | |

Lys Ala Leu Pro Gly Thr Asp Pro Asn Gln Lys Ile Leu Tyr Thr Ser 115 120 125

Ile Tyr Ser Ser Ala Asp Met Ile Val Met Asn Tyr Leu Ser Arg Leu 130 135 140

Asp Gly Ala Arg Asn Val Gln Ile His Gly Val Gly His Ile Gly Leu 145 155 160

Leu Tyr Ser Ser Gln Val Asn Ser Leu Ile Lys Glu Gly Leu Asn Gly 165 170 175

Gly Gly Gln Asn Thr Asn 180

<210> 56

<211> 444

<212> DNA

<213> Homo sapiens

<400> 56

gctgaccaac tgactgaaga gcagattgca gaattcaaag aagctttttc actatttgac 60 aaagatggtg atggaactat aacaacaaag gaattgggaa ctgtaatgag atctcttggg 120 cagaatccca cagaagcaga gttacaggac atgattaatg aagtagatgc tgatggtaat 180 ggcacaattg acttccctga atttctgaca atgatggcaa gaaaaatgaa agacacagac 240 agtgaagaag aaattagaga agcattccgt gtgtttgata aggatggcaa tggctatatt 300 agtgctgcag aacttcgcca tgtgatgaca aaccttggag agaagttaac agatgaagaa 360 gttgatgaaa tgatcaggga agcagatatt gatggtgatg qtcaagtaaa ctatgaagag 420 tttgtacaaa tgatgacagc aaag 444

<210> 57 <211> 2058

<212> DNA

<213> Bacillus circulans

57 <400> 60 gcgccggata cctcggtatc caacaagcaa aatttcagca ccgacgtcat ctatcaaatt 120 ttcaccgaca ggttttcgga cggcaatccc gccaacaatc cgaccggcgc ggcgtttgac ggaacctgca cgaacctccg gctgtattgc ggcggcgact ggcagggcat catcaacaaa 180 240 atcaacgacg gttacctgac cgggatgggc gttaccgcca tctggatctc ccagccggtc 300 gaaaacatct acagcatcat caattattcc ggcgtaaaca acacggccta tcacggctac 360 tgggcccggg acttcaagaa gacgaatccg gcctacggca cgattgcgga cttccagaac 420 ctgatcgccg ccgcgcatgc aaaaaacatc aaagtcatta tcgactttgc cccgaaccat 480 acgtcgcccg cctcgtccga ccagccttcc tttgcggaaa acggccggct gtacgataac 540 ggcacgctgc tcgggggata cacgaacgat acgcagaacc tgttccacca taacggcggc 600 acggactttt ccacgaccga aaacggcatc tacaaaaacc tgtacgatct cgccgacctg aaccataaca acagcaccgt ggacgtctac ttgaaggacg cgatcaaaat gtggctggac 660 720 ctcggcatcg acggcatccg catggatgcg gtgaagcata tgccgttcgg ctggcagaag 780 agctttatgg ctgccgtcaa caactataag ccggtcttta ccttcggcga atggttcctg ggcgtaaatg aagtgagccc ggaaaaccat aagtttgcca acgaatccgg catgagcctg 840 900 cttgatttcc gttttgccca aaaggtgcgg caggtgttcc gggacaacac cgacaatatg 960 tacggcctga aggcgatgct ggagggctcc gcagccgatt acgcccaggt ggatgaccag 1020 gtgacgttca tcgacaacca tgacatggag cgtttccacg caagcaatgc aaaccgccgg aagctggagc aagcgcttgc gttcacgctg acctcgcgcg gcgtccccgc catttattac 1080 1140 ggcaccgagc agtacatgtc gggcgggacc gatccggaca accgggcgcg gatcccttcc 1200 ttctccacgt cgacgaccgc ctatcaggtc attcaaaagc tggcgccgct gcgcaagtgc 1260 aacccggcca tcgcctacgg atcgacgcag gagcgctgga tcaacaacga cgtgctcatt 1320 tatgagcgca aattcggcag caacgttgcc gtcgttgccg tcaaccgcaa tttaaacgcg 1380 ccggcttcca tttcgggact tgtcacttcc ctgccgcaag gcagctacaa cgacgtcctt 1440 ggcggccttc tgaacggcaa cacgttatcg gtaggctccg gcggggccgc ctccaatttc

| acgcttgcg | g ccggcggcac | ggcggtgtgg | cagtacaccg | cggctacggc | gacgccgacc | 1500 |
|------------|--------------|------------|------------|------------|------------|------|
| atcgggcat | g tegggeegat | gatggccaag | ccgggcgtga | cgatcacgat | cgacggccgc | 1560 |
| ggcttcggc | t ctagcaaagg | caccgtctac | ttcggtacga | cggcggtgag | cggggcggac | 1620 |
| atcacgtct | t gggaagacac | gcagatcaaa | gtgaaaattc | cggccgtcgc | aggcggcaac | 1680 |
| tacaacatt | a aagtcgcaaa | cgctgccgga | acggcaagca | atgtgtatga | caacttcgag | 1740 |
| gtattgtcc | g gagaccaggt | cagcgtccgc | ttcgtggtca | acaacgcgac | gacggccctt | 1800 |
| gggcaaaat | g tgtacctgac | gggcagtgtc | agcgagctgg | ggaactggga | cccggcaaaa | 1860 |
| gcaatcggg | c cgatgtacaa | tcaggtcgtt | taccaatatc | cgaactggta | ttatgacgtc | 1920 |
| agcgttccg | g ccggcaaaac | gatcgagttc | aagtttttga | aaaaacaagg | ctccaccgtc | 1980 |
| acgtgggaag | g gcggcagcaa | ccacaccttc | accgcgccgt | ccagcggcac | cgcgaccatt | 2040 |
| aacgtgaatt | ggcagcca | | | | | 2058 |

<210> 58

<400> 58

60 atgcagcaat cgcatcaggc tggttacgca aacgccgccg accgggagtc tggcatcccc 120 gcagccgtac tcgatggcat caaggccgtg gcgaaggaaa aaaacgccac attgatgttc cgcctggtca acccccattc caccagcctg attgccgaag gggtggccac caaaggattg 180 ggcgtgcacg ccaagtcgtc cgattggggg ttgcaggcgg gctacattcc cgtcaacccg 240 300 aatctttcca aactgttcgg ccgtgcgccc gaggtgatcg cgcgggccga caacgacgtc 360 aacagcagcc tggcgcatgg ccataccgcg gtcgacctga cgctgtcgaa agagcggctt 420 gactatctgc ggcaagcggg cctggtcacc ggcatggccg atggcgtggt cgcgagcaac 480 cacgcaggct acgagcagtt cgagtttcgc gtgaaggaaa cctcggacgg gcgctatgcc gtgcagtatc gccgcaaggg cggcgacgat ttcgaggcgg tcaaggtgat cggcaatgcc 540 gccggtattc cactgacggc ggatatcgac atgttcgcca ttatgccgca tctgtccaac 600 ttccgcgact cggcgcgcag ttcggtgacc agcggcgatt cggtgaccga ttacctggcg 660

<211> 1197

<212> DNA

<213> Bordetella pertussis

| ggcctgg atcgcgaacg catcgac | tg 720 |
|----------------------------|----------|
| gcagtgg gcaccgaggc gcgtcgc | cag 780 |
| tcaccg atttcgagct ggaagtg | egc 840 |
| gegeagg aegtggteea geatgge | act 900 |
| agattt tegtegtate ggeeace | ggt 960 |
| gaataca ttggccagca gcgcggc | gag 1020 |
| rtggcgg ggaaaagcct gttcgac | gat 1080 |
| gttcga agttctcgcc ggatgta | tg 1140 |
| cgtcgc tgggcgcagt ggaacgc | 1197 |

<210> 59

<400> 60 gcgcagtccg tgccttacgg cgtatcacaa attaaagccc ctgctctgca ctctcaaggc tacactggat caaatgttaa agtagcggtt atcgacagcg gtatcgattc ttctcatcct 120 180 gatttaaagg tagcaggcgg agccagcatg gttccttctg aaacaaatcc tttccaagac 240 aacaactctc acggaactca cgttgccggc acagttgcgg ctcttaataa ctcaatcggt gtattaggcg ttgcgccaag cgcatcactt tacgctgtaa aagttctcgg tgctgacggt 300 360 tccggccaat acagctggat cattaacgga atcgagtggg cgatcgcaaa caatatggac 420 qttattaaca tqaqcctcqq cqqaccttct ggttctqctq ctttaaaaqc ggcagttgat 480 aaagccgttg catccggcgt cgtagtcgtt gcggcagccg gtaacgaagg cacttccggc agctcaagca cagtgggcta ccctggtaaa tacccttctg tcattgcagt aggcgctgtt 540 600 gacagcagca accaaagagc atctttctca agcgtaggac ctgagcttga tgtcatggca 660 cctggcgtat ctatccaaag cacgcttcct ggaaacaaat acggggcgta caacggtacg 720 tcaatqqcat ctccqcacqt tqccqqaqcq qctqctttqa ttctttctaa gcacccqaac 780 tggacaaaca ctcaagtccg cagcagttta gaaaacacca ctacaaaact tggtgattct

<211> 825

<212> DNA

<213> Bacillus amyloliquefaciens

| ttctactatg | gaaaagggct | gatcaacgta | caggcggcag | ctcag | | 825 |
|---|--------------|--------------|------------|------------|------------|-----|
| <210> 60 <211> 873 <212> DNA <213> The | | philus | | | | |
| <400> 60 atggaggcga | tgcttccgct | ctttgaaccc | aaaggccggg | tcctcctggt | ggacggccac | 60 |
| cacctggcct | accgcacctt | cttcgccctg | aagggcctca | ccacgagccg | gggcgaaccg | 120 |
| gtgcaggcgg | tctacggctt | cgccaagagc | ctcctcaagg | ccctgaagga | ggacgggtac | 180 |
| aaggccgtct | tcgtggtctt | tgacgccaag | gccccctcct | tccgccacga | ggcctacgag | 240 |
| gcctacaagg | cggggagggc | cccgaccccc | gaggacttcc | cccggcagct | cgccctcatc | 300 |
| aaggagctgg | tggacctcct | ggggtttacc | cgcctcgagg | tccccggcta | cgaggcggac | 360 |
| gacgttctcg | ccaccctggc | caagaaggcg | gaaaaggagg | ggtacgaggt | gcgcatcctc | 420 |
| accgccgacc | gcgacctcta | ccaactcgtc | tccgaccgcg | tcgccgtcct | ccaccccgag | 480 |
| ggccacctca | tcaccccgga | . gtggctttgg | gagaagtacg | gcctcaggcc | ggagcagtgg | 540 |
| gtggacttcc | gcgccctcgt | gggggacccc | tccgacaacc | tccccggggt | caagggcatc | 600 |
| ggggagaaga | ccgccctcaa | gctcctcaag | gagtggggaa | gcctggaaaa | cctcctcaag | 660 |
| aacctggacc | gggtaaagcc | agaaaacgtc | cgggagaaga | tcaaggccca | cctggaagac | 720 |
| ctcaggctct | ccttggagct | ctcccgggtg | cgcaccgacc | tccccctgga | ggtggacctc | 780 |
| gcccaggggc | gggagcccga | ccgggagggg | cttagggcct | tcctggagag | gctggagttc | 840 |
| ggcagcctcc | tccacgagtt | cggcctcctg | gag | | | 873 |
| | nerichia col | .i | | | | |
| <400> 61 gtgatttctt | atgacaacta | cgtcaccatc | cttgatgaag | aaacactgaa | agcgtggatt | 60 |
| gcgaagctgg | aaaaagcgcc | ggtatttgca | tttgataccg | aaaccgacag | ccttgataac | 120 |

| atctctgcta | acctggtcgg | gctttctttt | gctatcgagc | caggcgtagc | ggcatatatt | 180 |
|------------|------------|------------|------------|------------|------------|-----|
| ccggttgctc | atgattatct | tgatgcgccc | gatcaaatct | ctcgcgagcg | tgcactcgag | 240 |
| ttgctaaaac | cgctgctgga | agatgaaaag | gcgctgaagg | tcgggcaaaa | cctgaaatac | 300 |
| gatcgcggta | ttctggcgaa | ctacggcatt | gaactgcgtg | ggattgcgtt | tgataccatg | 360 |
| ctggagtcct | acattctcaa | tagcgttgcc | gggcgtcacg | atatggacag | cctcgcggaa | 420 |
| cgttggttga | agcacaaaac | catcactttt | gaagagattg | ctggtaaagg | caaaaatcaa | 480 |
| ctgaccttta | accagattgc | cctcgaagaa | gccggacgtt | acgccgccga | agatgcagat | 540 |
| gtcaccttgc | agttgcatct | gaaaatgtgg | ccggatctgc | aaaaacac | | 588 |

<210> 62

<211> 1637

<212> DNA

<213> Thermus aquaticus

85

<220>

<221>, CDS

<222> (1)..(1635)

| ag | 00> c ccc r Pro | | | | | | - | | | | - | - | | | | | 48 |
|-----|-----------------------|-----|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|
| tt | c gtg e Val | | | | | | | | gag | | | | | gat | | | 96 |
| | g gcc ı Ala | _ | gcc | _ | _ | | | ggc | | _ | | | gcc | | | | 144 |
| | tat Tyr 50 | aaa | | | | | ctg | _ | - | | | ggg | | | - | - | 192 |
| | a gac s Asp | _ | _ | - | | gcc | | | _ | | ctt | | | _ | | 2 | 240 |
| ggo | c gac / Asp | | | Met | | | | | | ctg | | | | | acc | 2 | 288 |

90

| | | | | | | cgg Arg | | | | | | | | | | 336 |
|------------|------------|-------------------|-------------------|------------|------------|-------------------|-------------------|-------------------|------------|------------|------------|-------------------|-------------------|------------|------------|-----|
| gcg Ala | GJA āāā | gag Glu 115 | cgg Arg | gcc Ala | gcc Ala | ctt Leu | tcc Ser 120 | gag Glu | agg Arg | ctc Leu | ttc Phe | gcc Ala 125 | aac Asn | ctg Leu | tgg Trp | 384 |
| | | | | | | gag Glu 135 | | | | | | | | | | 432 |
| | | | | | | gtc Val | | | | | | | | | | 480 |
| | | | | | | ctc Leu | | | | | | | | | | 528 |
| gag Glu | atc Ile | gcc Ala | cgc Arg 180 | ctc Leu | gag Glu | gcc Ala | gag Glu | gtc Val 185 | ttc Phe | cgc Arg | ctg Leu | gcc Ala | ggc Gly 190 | cac His | ccc Pro | 576 |
| | | | | | | gac Asp | | | | | | | | | | 624 |
| | | | | | | ggc Gly 215 | | | | | | | | | | 672 |
| | | | | | | gag Glu | | | | | | | | | | 720 |
| | | | | | | cgg Arg | | | | | | | | | | 768 |
| | | | | | | ctc Leu | | | | | | | | | | 816 |
| | | | | | | gcc Ala | | | | | | | | | | 864 |
| | | | | | | atc Ile | | | | | | | | | | 912 |

290 295 300

| | 250 | | | | | 230 | | | | | 300 | | | | | |
|-------------------|-----|------------|------------|------------|-------------------|-----|------------|------------|------------|-------------------|-----|------------|------------|------------|-------------------|------|
| atc Ile 305 | Arg | cgg Arg | gcc Ala | ttc Phe | atc Ile 310 | Ala | gag Glu | gag Glu | Gly ggg | tgg Trp 315 | Leu | ttg Leu | gtg Val | gcc Ala | ctg Leu 320 | 960 |
| | | | | | gag Glu | | | | | Āla | | | | | | 1008 |
| | | | | | gtc Val | | | | Gly | | | | | Thr | | 1056 |
| | | | | | ttc Phe | | _ | Pro | | | _ | | _ | | _ | 1104 |
| | | | | | aag Lys | | | | | | | | | | | 1152 |
| | | | | | tcc Ser 390 | | | | | | | | | | | 1200 |
| | | | | | cgc Arg | _ | | _ | _ | | | _ | | | _ | 1248 |
| | | | | | ctg Leu | | | | | | | | | | | 1296 |
| | | | | | cgc Arg | | | | | | | | | | | 1344 |
| _ | _ | | | | gcg Ala | _ | | _ | _ | _ | | | _ | | _ | 1392 |
| | | | | | gac Asp 470 | | | | | | | | | | | 1440 |
| | | | Glu | | atg Met | | | | | | | | | | | 1488 |
| gag | ctg | gtc | ctc | gag | gcc | cca | aaa | gag | ggg | gcg | gag | gcc | gtg | gcc | cgg | 1536 |

| Glu | Leu | Val | Leu 500 | Glu | Ala | Pro | Lys | Glu 505 | _ | Ala | Glu | Ala | Val 510 | Ala | Arg | |
|------------------------------|--------------|---------------------------|------------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|------------|-----------|-----------|------|
| | | aag Lys 515 | | | | | | | | | | | | | | 1584 |
| | | gag Glu | | | | | | | | | | | | | | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | 1637 |
| <210 <211 <212 <213 | 1> . 2> . | 63 545 PRT Theri | nus a | aquat | ticus | 5 | | | | | | | | | | |
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| Ser 1 | Pro | Lys | Ala | Leu 5 | Glu | Glu | Ala | Pro | Trp 10 | Pro | Pro | Pro | Glu | Gly 15 | Ala | |
| Phe | Val | Gly | Phe 20 | Val | Leu | Ser | Arg | Lys 25 | Glu | Pro | Met | Trp | Ala 30 | Asp | Leu | |
| Leu | Ala | Leu 35 | Ala | Ala | Ala | Arg | Gly 40 | Gly | Arg | Val | His | Arg 45 | Ala | Pro | Glu | |
| Pro | Tyr 50 | Lys | Ala | Leu | Arg | Asp 55 | Leu | Lys | Glu | Ala | Arg 60 | Gly | Leu | Leu | Ala | |
| Lys 65 | Asp | Leu | Ser | Val | Leu 70 | Ala | Leu | Arg | Glu | Gly 75 | Leu | Gly | Leu | Pro | Pro 80 | |
| Gly | Asp | Asp | | Met 85 | Leu | Leu | Ala | Tyr | Leu 90 | Leu | Asp | Pro | Ser | Asn 95 | Thr | |
| Thr | Pro | Glu | Gly 100 | Val | Ala | Arg . | Arg | Tyr 105 | Gly | Gly | Glu | Trp | Thr 110 | Glu | Glu | |

| Ala | GTA | 115 | - | . ATa | ALa | Leu | 120 | | ı Arg | , Leu | . Phe | 125 | | . ьеи | Trp |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Gly | Arg 130 | Leu | Glu | Gly | Glu | Glu 135 | | Leu | Leu | Trp | Leu 140 | | Arg | Glu | Val |
| Glu 145 | Arg | Pro | Leu | Ser | Ala 150 | Val | Leu | Ala | His | Met 155 | | Ala | Thr | Gly | Val 160 |
| Arg | Leu | Asp | Val | Ala 165 | | Leu | Arg | Ala | Leu 170 | | Leu | Glu | Val | Ala 175 | Glu |
| Glu | Ile | Ala | Arg 180 | Leu | Glu | Ala | Glu | Val 185 | | Arg | Leu | Ala | Gly 190 | His | Pro |
| Phe | Asn | Leu 195 | Asn | Ser | Arg | Asp | Gln 200 | Leu | Glu | Arg | Val | Leu 205 | Phe | Asp | Glu |
| Leu | Gly 210 | Leu | Pro | Ala | Ile | Gly 215 | Lys | Thr | Glu | Lys | Thr 220 | Gly | Lys | Arg | Ser |
| Thr 225 | Ser | Ala | Ala | Val | Leu 230 | Glu | Ala | Leu | Arg | Glu 235 | Ala | His | Pro | Ile | Val 240 |
| Gly | Lys | Ile | Leu | Gln 245 | Tyr | Arg | Glu | Leu | Thr 250 | Lys | Leu | Lys | Ser | Thr 255 | Tyr |
| Ile | Asp | Pro | Leu 260 | Pro | Asp | Leu | Ile | His 265 | Pro | Arg | Thr | Gly | Arg 270 | Leu | His |
| Thr | Arg | Phe 275 | Asn | Gln | Thr | Ala | Thr 280 | Ala | Thr | Gly | Arg | Leu 285 | Ser | Ser | Ser |
| Asp | Pro 290 | Asn | Leu | Gln | Asn | Ile 295 | Pro | Val | Arg | Thr | Pro 300 | Leu | Gly | Gln | Arg |
| Ile 305 | Arg | Arg | Ala | Phe | Ile 310 | Ala | Glu | Glu | Gly | Trp 315 | Leu | Leu | Val | Ala | Leu 320 |

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Cys Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu , Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Val Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu

Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540

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| | | 115 | 5 | | | | 120 |) | | | | 125 | 5 | | | |
|-----|-----|-----|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| | | Let | gag Glu | | | | Arc | | | | | Tyr | | | | 432 |
| | Arg | | ctt Leu | | | Val | | | | | Glu | | | | | 480 |
| | | | gtg Val | | Tyr | | | | | | | | | | Glu | 528 |
| | | | cgc Arg 180 | | | - | | _ | | | _ | _ | | _ | | 576 |
| | | | aac Asn | | | | | Leu | | | | | | | | 624 |
| | | | ccc Pro | | | | | | | | | | | | | 672 |
| | | | gcc Ala | | | | | | | | | | | | | 720 |
| | | | ctg Leu | | | | | | | | | | | | | 768 |
| | | | ttg Leu 260 | | | | | | | | | | | | | 816 |
| | | | aac Asn | | | | | | | | | | | | | 864 |
| | | | ctc Leu | | | | | | | | | | | | | 912 |
| | | | gcc Ala | Phe | | | | | Gly | | | | | | | 960 |
| gac | tat | agc | cag | ata | gag | ctc | agg | gtg | ctg | gcc | cac | ctc | tcc | ggc | gac | 1008 |

| Asp | Tyr | Ser | Gln | Ile 32 _, 5 | | Leu | Arg | Val | Leu 330 | | His | Leu | Ser | Gly 335 | | |
|------------|------------|--------------|-------------------|--------------------------|------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------|
| gag Glu | aac Asn | : ctg Leu | atc Ile 340 | Arg | gtc Val | ttc Phe | cag Gln | gag Glu 345 | GJA aaa | cgg Arg | gac Asp | atc Ile | cac His 350 | Thr | gag Glu | 1056 |
| | | | tgg Trp | | | | | | | | | | Āsp | | | 1104 |
| - | _ | Arg | gcg Ala | _ | _ | | | | | | _ | Leu | | | _ | 1152 |
| | | | cgc Arg | | | | | | | | | | | | | 1200 |
| | | | att Ile | | | | | | | | | | | | | 1248 |
| | | | aag Lys 420 | | | | | | | | | | | | | 1296 |
| | | | ggc Gly | | | - | | | | - | | | _ | | | 1344 |
| | | | cgg Arg | | | | | | | | | | | | | 1392 |
| | | | gcc Ala | | | | | | | | | | | | | 1440 |
| | | | gag Glu | | | | | | | | | | | | | 1488 |
| | | | ctc Leu 500 | | | | Lys | | | | | | | | | 1536 |
| | Ala | | gag Glu | | | Glu | | | | | | | | | | 1584 |

| gag gtg gag gtg ggg ata ggg gag gac cgg ctc tcc gcc aag gag gcg Glu Val Glu Val Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala 530 540 | 1632 |
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| gcc gc Ala 545 | 1637 |
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| Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30 | |
| Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45 | |
| Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 | |
| Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 75 80 | |
| Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95 | |
| Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu 100 105 110 | |
| Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125 | |
| Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140 | |

| Glu 145 | | Pro | Leu | . Ser | Ala 150 | | Leu | Ala | His | Met 155 | | Ala | Thr | Gly | Val 160 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Arg | Leu | Asp | Val | Ala 165 | Tyr | Leu | Arg | Ala | Leu 170 | | Leu | Glu | . Val | Ala 175 | |
| Glu | Ile | Ala | Arg 180 | | Glu | Ala | Glu | Val 185 | Phe | Arg | Leu | Ala | Gly 190 | Arg | Pro |
| Phe | Asn | Leu 195 | Asn | Ser | Arg | Asp | Gln 200 | Leu | Glu | Arg | | Leu 205 | | Asp | Glu |
| Leu | Gly 210 | | Pro | Ala | Ile | Gly 215 | Lys | Thr | Glu | Lys | Thr 220 | Gly | Lys | Arg | Ser |
| Thr 225 | Ser | Ala | Ala | Val | Leu 230 | Glu | Ala | Leu | Arg | Glu 235 | Ala | His | Pro | Ile | Val 240 |
| Glu | Lys | Ile | Leu | Gln 245 | Tyr | Arg | Glu | | Thr 250 | Lys | Leu | Lys | Ser | Thr 255 | Tyr |
| Ile | Asp | Pro | Leu 260 | Pro | Asp | Leu | Ile | His 265 | Pro | Arg | Thr | Gly | Arg 270 | Leu | His |
| Thr | Arg | Phe 275 | Asn | Gln | Thr | Ala | Thr 280 | Ala | Thr | Gly | Arg | Leu 285 | Ser | Ser | Ser |
| Asp | Pro 290 | Asn | Leu | Gln | Asn | Ile 295 | Pro | Val | Arg | Thr | Pro 300 | Leu | Gly | Gln | Arg |
| Ile 305 | Arg | Arg | Ala | Phe | Ile 310 | Ala | Glu | Glu | Gly | Trp 315 | Leu | Leu | Val | Ala | Leu 320 |
| Asp | Tyr | Ser | Gln | Ile 325 | Glu | Leu | Arg | Val | Leu 330 | Ala | His | Leu | Ser | Gly 335 | Asp |
| Glu | Asn | | Ile 340 | Arg | Val | Phe | | Glu 345 | Gly | Arg | Asp | Ile | His 350 | Thr | Glu |

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480

Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

Glu Val Glu Val Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala 530 540

Ala

545

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| Glu 145 | | Pro | Leu | . Ser | Ala 150 | | Leu | ı Ala | His | Met 155 | | ı Ala | . Thr | : Gly | 7 Val 160 | |
|-------------------|------------|------------|------------|------------|-------------------|------------|------------|-------------------|------------|-------------------|------------|------------|------------|------------|-------------------|------|
| | | | | | Tyr | | | | | Ser | | | | | gag Glu | 528 |
| | | | | Leu | | | | gtc Val 185 | Phe | _ | _ | _ | | His | | 576 |
| | | | | | | | | ctg Leu | | | | | Phe | | | 624 |
| | | | | | | | | acg Thr | | | | | | | | 672 |
| | | | | | | | | ctc Leu | | | | | | | | 720 |
| | | | | | | | | ctc Leu | | | | | | | | 768 |
| | | | | | | | | cac His 265 | | | | | | | | 816 |
| | | | | | | | | gcc Ala | | | | | | | | 864 |
| Asp | | | | | | | | atc Ile | | | | | | | | 912 |
| atc Ile 305 | cgc Arg | cgg Arg | gcc Ala | ttc Phe | atc Ile 310 | gcc Ala | gag Glu | gag Glu | Gly ggg | tgg Trp 315 | cta Leu | ttg Leu | gtg Val | gcc Ala | ctg Leu 320 | 960 |
| | | | Gln | | | | | gtg Val | | | | | | | | 1008 |
| gag Glu | | Leu | | | | | Gln | gag Glu 345 | | | | | | | | 1056 |

| | | | Trp | | | | | Pro | | | | Asp | ctg Leu | 1104 |
|-------------------|-----|-----|-----|---|-----|-----|-----|-----|---|-------------------|-----|-----|------------|------|
| | | Arg | | | | | Ile | | | Gly aga | Leu | | atg Met | 1152 |
| | Ala | | | | | Gln | | | | atc Ile 395 | | | | 1200 |
| | | | | | | | | | | ttc Phe | | | | 1248 |
| | | | | | | | | | | agg Arg | | | | 1296 |
| | | | | | - | _ | | | | gac Asp | | _ | | 1344 |
| | | | | | | _ | | _ | _ | gcc Ala | | _ | _ | 1392 |
| | | | | | | | | | | gct Ala 475 | | | | 1440 |
| | | _ | | - | _ | | _ | | _ | ctc Leu | _ | _ | _ | 1488 |
| | | | | | | | | | | gcg Ala | | | | 1536 |
| | | | | | | Glu | | | | ccc Pro | | | | 1584 |
| | | | | | Ile | | | | | ctc Leu | | | | 1632 |
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<211> 545

<212> PRT

<213> Thermus aquaticus

<400> 67

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Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 . 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 150

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 -Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Ile Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Phe His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met

370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Lys Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480

Pro Arg Leu Glu Glu Met Glu Ala Arg Met Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

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Ala 545

<210> 68

<211> 1637

<212> DNA

<213> Thermus aquaticus

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| | | | | | | | _ | _ | | | _ | _ | gat Asp | | 96 |
| | | | | | | | | | | | | | ccc Pro | | 144 |
| | | | _ | | | _ | | | | | | | ctc Leu | | 192 |
| | _ | _ | | _ | _ | _ | _ | | _ | | | | ccg Pro | | 240 |
| | _ | _ | | _ | | | _ | | | _ | _ | | aac Asn 95 | | 288 |
| | | | | | | | | | | | | | gag Glu | | 336 |
| | | | | | | | | | | | | | ctg Leu | | 384 |
| | | | | | | | | | | | | | gag Glu | | 432 |
| | | | | | | | | | | | | | GJÀ aaa | | 480 |
| _ | | _ | | _ | | | | Āla | | | | _ | gcc Ala 175 | | 528 |

| | | | | Leu | | | | | Phe | | | | | His | ccc Pro | 5 | 76 |
|------------|----------------|-------------------|-------------------|------------|------------|------------|-------------------|--------------------|------------|------------|------------|-------------------|-------------------|------------|------------|-----|----|
| ttc Phe | : aac : Asn | ctc Leu 195 | Asn | tcc Ser | cgg Arg | gac Asp | cag Gln 200 | Leu | gaa Glu | agg Arg | gtc Val | cto Leu 205 | Phe | gac Asp | gag Glu | 6 | 24 |
| | | Leu | | | | | | acg Thr | | | | Gly | | | | 6 | 72 |
| | Ser | | | | | | | ct c Le u | | | Ala | | | | | 7 | 20 |
| | | | | | | | | ctc Leu | | | | | | | | 7 | 68 |
| | | | | | | | | cac His 265 | | | | | | | | 8: | 16 |
| | | | | | | | | gcc Ala | | | | | | | | | 64 |
| | | | | | | | | gtc Va l | | | | | | | | 91 | 12 |
| | | | | | | | | gag Glu | | | | | | | | 96 | 50 |
| | | | | | | | | gtg Val | | | | | | | | 100 | 8 |
| gag Glu | aac Asn | Leu | atc Ile 340 | cgg Arg | gtc Val | ttc Phe | Gln | gag Glu 345 | GJÀ āāā | cgg Arg | gac Asp | atc Ile | cac His 350 | acg Thr | gag Glu | 105 | 66 |
| acc Thr | Ala | agc Ser 355 | tgg Trp | atg Met | ttc Phe | Gly | gtc Val 360 | ccc Pro | cgg Arg | gag Glu | gcc Ala | gtg Val 365 | gac Asp | ccc Pro | ctg Leu | 110 | 4 |
| Met | | | | | Lys | | | aac Asn | | Gly | | | | | | 115 | 2 |

| | | | | | | cag Gln | | | | | | | | | gcc Ala 400 | 1200 |
|----------------------|------------|---------------|------------|-------------------|------------|-------------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|-------------------|------|
| cag Gln | gcc Ala | ttc Phe | att Ile | gag Glu 405 | cgc Arg | tac Tyr | ttt Phe | cag Gln | agc Ser 410 | ttc Phe | ccc Pro | aag Lys | gtg Val | cgg Arg 415 | gcc Ala | 1248 |
| | | | | | | gag Glu | | | | | | | | | | 1296 |
| | | | | | _ | cgc Arg | | | | _ | | | _ | | | 1344 |
| | | | | | | gcc Ala 455 | | | | | | | | | | 1392 |
| | | | | | | ctc Leu | | | | | | | | | | 1440 |
| | | | | | | Gly | | | | | | | | | | 1488 |
| | | | | | | cca Pro | | | | | | | | | | 1536 |
| ctg Leu | Āla | _ | Glu | _ | Met | gag Glu | Gly | Val | | Pro | _ | Āla | | | _ | 1584 |
| gag Glu | | | | | Ile | | | | | | | | | | | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | 1637 |
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<213> Thermus aquaticus

<400> 69

Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala 1 5 10 15

Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Tæp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu

195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Ser Gly Lys Arg Ser 210 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Asp His Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 . 310 320

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu
340 345 350

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu
420 425 430

Thr Leu Phe Gly Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480

Pro Arg Leu Glu Glu Met Gly Ala Arg Lys Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

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| | | | | | | | | | | | | | gag Glu | 144 |
| | | | | | | | | | | | | | grcc Ala | 192 |
| | | | | | | | | | | | | | ccc Pro 80 | 240 |
| ~ ~ | _ | _ | | | | - | | | _ | _ | | | acc Thr | 288 |
| | | | | | | - | | | | | | | gag Glu | 336 |
| | | | | | | | | | | | | | t gg T rp | 384 |
| | | | | | | | | | | | | | gtg Val | 432 |
| | | | | | | | | | | | | | gtg Val 160 | 480 |
| _ | _ | _ | | _ | | | _ | _ | | _ | | _ | gag Glu | 528 |
| | | | | | gcc Ala | | | | | | | | | 576 |
| | | | | | gac Asp | | | | | | | | | 624 |

| | Leu | | | | | | | | | Gl⊅ gg⊂ | | | | 672 |
|---|-----|---|---|---|---|---|---|---|-------|-------------------|---|---|---|------|
| | | | | | | | | | | cac His | | | | 720 |
| | | | | | | | | | | aag Lys | | | | 768 |
| _ | | _ | _ | _ | | | | | | gg⊂ | | | | 816 |
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| | | | | | | | | | | ttg Leu | | | | 960 |
| | | | | | | | | | | ctc Leu | | | | 1008 |
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| | | | | | | | | | | gtg Val 365 | | | | 1104 |
| | | | | | | | | | | ctc Leu | | | | 1152 |
| | | | | | | | | | | tac Tyr | | | | 1200 |
| | | | | | | | | | | aag Lys | | | | 1248 |

| | | *** | 2000 | ,00000 | o . | | | | | | | | | 101/ | 102002,00072 | , - |
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| | | | | 405 | | | | | 410 | | | | | 415 | | |
| | | | | | ctg Leu | | | | | | | | | | | 1296 |
| | | | | | cgc Arg | | | | | | | | | | | 1344 |
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| ctg Leu | gcc Ala | aag Lys 515 | gag Glu | gtc Val | atg Met | gag Glu | ggg Gly 520 | gtg Val | tat Tyr | ccc Pro | ctg Leu | gcc Ala 525 | gtg Val | ccc Pro | ctg Leu | 1584 |
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PCT/IB2005/000734

15

WO 2005/083068

Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu

5

20 25 30

Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Glu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val
145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 1.65 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Arg Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arq Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arq Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 440 445 435 Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 460 450 455 Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Thr Met Val Lys Leu Phe 470 475 Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495 Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 -520 525 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 . Ala 545 <210> 72 <211> 1637 <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (1)..(1635)<400> 72 48 age eee aag gee etg gag gag gee eee tgg eee eeg eeg gaa ggg gee Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Glu Gly Ala 10 96 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

| _ | | | _ | _ | - | | | | | _ | | _ | | | gag Glu | 144 |
|---|-------------------|---|---|---|-----|---|---|-----|---|---|---|---|---|---|------------|-----|
| | tat Tyr 50 | | | | | | | | | | | | | | | 192 |
| | gac Asp | _ | | _ | _ | _ | _ | | _ | | | | | _ | | 240 |
| | gac Asp | _ | | _ | | | _ | | | _ | _ | | | | | 288 |
| | ccc Pro | | | | | | | | | | | | | | | 336 |
| | Gly ggg | _ | | _ | - | | | | | | | _ | | _ | | 384 |
| | agg Arg 130 | | | | | | | | | | | | | | | 432 |
| | agg Arg | | | | _ | _ | _ | _ | | _ | | _ | _ | | | 480 |
| _ | ctg Leu | _ | | _ | | | | Āla | _ | | _ | | | _ | | 528 |
| | atc Ile | _ | _ | | | _ | | _ | | _ | _ | _ | | | | 576 |
| | aac Asn | | | | | | | | | | | | | | | 624 |
| | ggg Gly 210 | | | | Ile | | | | | | | | | | | 672 |
| | agc Ser | _ | | | | | - | | _ | | _ | | | | | 720 |

| 225 | • | | | | 230 | | | | | 235 | , | | | | 240 | |
|-----|-----|-----|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|-------|
| | | | | | Tyr | | | | | Lys | | | | | tac Tyr | 768 |
| | | | ttg Leu 260 | Pro | | | | | Pro | | | | | Leu | cac His | 816 |
| | - | | aac Asn | _ | _ | _ | _ | Āla | | | | | Ser | _ | | 864 |
| | | Asn | ctc Leu | | | | | | | | | | | | | 912 |
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| | | | cag Gln | | | | | | | | | | | | | "1008 |
| | | | atc Ile 340 | | | | | | | | | | | | | 1056 |
| | | | tgg Trp | | | | | | | | | | | | | 1104 |
| | | | gcg Ala | | | | | | | | | | | | | 1152 |
| | | | cgc Arg | | | | | | | | | | | | | 1200 |
| | | | att Ile | | | | | | | | | | | | | 1248 |
| | | | aag Lys 420 | | | | Glu | | | | | | | | | 1296 |
| acc | ctc | ttc | ggc | cgc | cgc | cgc | tat | gtg | cct | gac | cta | gag | gcc | cgg | gtg | 1344 |

| Thr | Leu | Phe 435 | Gly | Arg | Arg | Arg | Tyr 440 | | Pro | Asp | Leu | Glu 445 | | Arg | Val | |
|------------------------------|------------|-----------------------|-----------|----------|-------|-----|------------|-----------|-----------|-----|-------------------|------------|-----------|-----------|-------------------|------|
| | | | | | | | | | | | | Asn | | | gtc Val | 1392 |
| _ | | | _ | _ | _ | | - | _ | _ | _ | - | | _ | | ttc Phe 480 | 1440 |
| | | _ | _ | | _ | | _ | | _ | | ctt Leu | _ | _ | | Āsp | 1488 |
| | | | | | | | | | | | gag Glu | | | | | 1536 |
| | | | | | | | | | | | ctg Leu | | | | | 1584 |
| Glu | | | | | | | | | | | tcc Ser 540 | | | | | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | 1637 |
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| Phe ' | Val (| | Phe 20 | Val | Leu | Ser | | Lys 25 | Glu | Pro | Met | Trp | Ala 30 | Asp | Leu | |
| Leu A | | Leu <i>1</i> 35 | Ala | Ala | Ala . | | Gly 40 | Gly | Arg | Val | | Arg 45 | Ala | Pro | Glu | |

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Leu Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Ala Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Tyr Asn Met Pro Val

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480 Thr Arg Leu Glu Glu Thr Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510 Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 535 540 530 Ala 545 <210> 74 <211> 1637 <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (1)..(1635)<400> 74 age eee aag gee etg gag gee eee tgg eee eeg eeg gaa ggg gee 48 Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala 1 5 10 15 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atq tqg gcc qat ctt 96 Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 25 20 144 ctg gcc ctg gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 cct tat aaa gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc 192 Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala

50 55 60

| | | - | | | | | | | | | | | | | | | |
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| | | | | agc Ser | | | | | | | | | | | | | 240 |
| | | _ | _ | ccc Pro | _ | | | _ | | | _ | _ | | | | | 288 |
| | | | | ggg Gly 100 | | | | _ | | | | | | | | | 336 |
| | _ | | | cgg Arg | _ | _ | | | | | | | _ | | _ | | 384 |
| | | | | gag Glu | | | | | | | | | | | | | 432 |
| | | | | ctt Leu | | | | | | | | | | | | | 480 |
| | _ | _ | _ | gtg Val | _ | | | | _ | _ | | _ | | | _ | | 528 |
| | | | | cgc Arg 180 | | | | | | | | | | | | | 576 |
| | | | | aac Asn | | | | | | - | | - | | | _ | | 624 |
| | Leu | | | ccc Pro | _ | | | _ | _ | | _ | | | _ | _ | | 672 |
| | | - | _ | gcc Ala | - | _ | | - | | _ | | _ | | | | | 720 |
| | | | | ctg Leu | | | | | Leu | | | | | Ser | | | 768 |
| ä | att | gac | CCC | ttg | ccg | gac | ccc | atc | cac | ccc | agg | acg | ggc | cgc | ctc | cac | 816 |

| Ile | Asp | Pro | Leu 260 | | Asp | Pro | Ile | His 265 | | Arg | Thr | Gly | Arg 270 | His | |
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| | | | Asn | | | gcc Ala | | | | | | | | | 864 |
| | | | | | | atc Ile 295 | | | | | | | | | 912 |
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| _ | | | _ | | | ctc Leu | | | _ | _ | | | | - | 1008 |
| | | | | | | ttc Phe | | | | | | | | | 1056 |
| | | | | - | | ggc Gly | | | | - | _ | | _ | _ | 1104 |
| _ | _ | | _ | _ | _ | acc Thr 375 | | | | | _ | | | _ | 1152 |
| | | | | | | cag Gln | | | | | | | | | 1200 |
| | | | | | | tac Tyr | | | | | | | | | 1248 |
| | | | | | | gag Glu | | | | | | | | | 1296 |
| | | | | | | cgc Arg | | | | | | | | | 1344 |
| Lys | | | | | Ala | gcc Ala 455 | | | | Āla | | | | | 1392 |

| cag ggc acc gcc gcc gac ctc atg aag ctg gct atg gtg aag ctc ttc Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 480 | 1440 |
|---|------|
| ccc agg ctg gag gaa atg ggg gcc agg atg ctc ctt cag gtc cac gac Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495 | 1488 |
| gag ctg gtc ctc gag gcc cca aaa gag ggg gcg gag gcc gtg gtc cgg Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Val Arg 500 505 510 | 1536 |
| ctg gcc aag gag gtc atg gag ggg gtg tat ccc ctg gcc gtg ccc ctg Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 | 1584 |
| gag gtg aag gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg Glu Val Lys Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Ļys Glu Ala 530 540 | 1632 |
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| Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30 | |
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| Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 | |
| Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80 | |

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Pro Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser

.

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Thr Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp

485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Val Arg 500 505 510

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| Ser | Pro | Lys | Ala | Leu | Glu | Glu | Ala | Pro | Trp | Pro | Pro | Pro | Ğlu | Glv | Ala | |
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ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt
Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu
20 25 30

ctg gcc ctg gcc gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag
Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu
35 40 45

cct tat aaa gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc 192
Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala
50 55 60

aaa gac ctg agc gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 70 75 80

ggc gac gac ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc

| Gly | Asp | Asp | Pro | Met 85 | Leu | Leu | Ala | Tyr | Leu 90 | Leu | Asp | Pro | Ser | Asn 95 | Thr | | |
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| | | | ggg Gly 100 | | | | | | | | | | | | | | 336 |
| | | | cgg Arg | | | | | | | | | | | | | | 384 |
| | | | gag Glu | | | | | | | | | Tyr | | | | | 432 |
| | | | ctt Leu | | | | | | | | | | | | | | 480 |
| | | | gtg Val | | | | | | | | | | | | | | 528 |
| | | | cgc Arg 180 | | | _ | | _ | | - | _ | - | | | | | 576 |
| | | | aac Asn | | | | | | | | | | | | | | 624 |
| | | | ccc Pro | | | | _ | _ | | _ | | | _ | _ | | | 672 |
| | | | gcc Ala | | - | | | | - | - | - | | | | _ | | 720 |
| | | | ctg Leu | | | | | | | | | | | | | , | 768 |
| | | | ttg Leu 260 | | | | Phe | | | | | Gly | | | | ; | 816 |
| | Arg | | aac Asn | | | Ala | _ | | _ | | | | _ | - | | 8 | 864 |

| | | Asn | | cag Gln | | Pro | | | | Leu | | agg Arg | 912 |
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| | Arg | | | ttc Phe | | | | | Leu | | | | 960 |
| _ | | | _ | ata Ile 325 | | | _ | Āla | | | | Āsp | 1008 |
| | | | | cgg Arg | | | | | | | | | 1056 |
| | | | | atg Met | | | | | | | | | 1104 |
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| | | | | ctc Leu | | | | | | | | | 1200 |
| | | | | gag Glu 405 | | | | | | | | | 1248 |
| | | | | acc Thr | | | | | | | | | 1296 |
| | | | | cgc Arg | | | | | | | | | 1344 |
| | | | | gag Glu | | | | | | | | | 1392 |
| | | | | gcc Ala | | | | | | | | | 1440 |
| | | _ | - | gaa Glu 485 | | _ | _ | | | _ | _ | _ | 1488 |

| | 1506 |
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| gag ctg gtc ctc gag gcc cca aaa gag ggg gcg gag gcc gtg gcc cgg Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510 | 1536 |
| ctg gcc aag gag gtc atg gag ggg gtg tat ccc ctg gcc gtg ccc ctg Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 | 1584 |
| gag gtg gag gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 | 1632 |
| gcc gc Ala 545 | 1637 |
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| Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30 | |
| Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45 | |
| Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 | |
| Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80 | |
| Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95 | |
| Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu 100 105 110 | |

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Phe His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Val Leu

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Ser Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg
500 505 510

Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 535 540 530 Ala 545 <210> 78 1637 <211> <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (1)..(1635)<400> 78 48 age eee aag gee etg gag gag gee eee tgg eee eeg gaa ggg gee Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Glu Gly Ala 1.0 1.5 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt 96 Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 ctg gcc ctg gcc gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag 144 Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 40 35 45 cct tat aaa gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc 192 Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 aaa gac ctg agc gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc 240 Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 70 ggc gac gac ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc 288 Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95 acc ccc gag ggg gtg gcc cgg cgc tac ggc ggg gag tgg acg gag gag 336 Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu 105 100 110

| | | | Arg | _ | | | | Glu | | | | _ | Asn | _ | tgg Trp | 384 |
|-----|---|-----|-----|---|-----|-----|---|-----|-------------------|---|-----|-----|-----|---|-------------------|-----|
| | | Leu | | | | | | | | | | Tyr | | | gtg Val | 432 |
| | | | | | | Val | | | | | Glu | | | | gtg Val 160 | 480 |
| _ | - | _ | | _ | Tyr | | | _ | _ | | _ | | | _ | gag Glu | 528 |
| | | | - | | | _ | | - | ttc Phe | - | _ | _ | | | | 576 |
| | | | | | | _ | _ | _ | gaa Glu | | _ | | | - | | 624 |
| | | | | _ | | | _ | _ | gag Glu | _ | | | _ | _ | | 672 |
| | | | | | | | | | cgc Arg | | | | | | | 720 |
| | _ | | _ | _ | | | | | acc Thr 250 | _ | _ | _ | _ | | | 768 |
| | _ | | _ | _ | _ | | | | ccc Pro | | _ | | _ | | | 816 |
| | _ | | | _ | _ | Āla | _ | - | acg Thr | | | | _ | - | | 864 |
| Asp | | | | | | | | | cgc Arg | | | | | | | 912 |
| | | | | | | | | | Gly ggg | | | | | | | 960 |

| | | | | | Glu | | | | | Ala | | | | | gac Asp | 1008 |
|------------|------------|-----|-------------------|------------|------------|------------|-----|-------------------|-------------------|------------|------------|------------|-------------------|------------|------------|------|
| | | | | Arg | | | | | Gly | | | | | | gag Glu | 1056 |
| | | | Trp | | | | | Pro | cga Arg | | | | Āsp | | ctg Leu | 1104 |
| | | | | | | | | | ttc Phe | | | Leu | | | | 1152 |
| | Āla | | | | | | | | gcc Ala | | | | | | | 1200 |
| | | | | | | | | | agc Ser 410 | | | | | | | 1248 |
| | | | | | | | | | agg Arg | | | | | | | 1296 |
| | | | | _ | - | _ | | | cca Pro | _ | | | _ | | | 1344 |
| Lys | Ser | Val | Arg | Lys | Ala | Ala | Glu | Arg | aag Lys | Āla | Phe | Asn | | | | 1392 |
| | | | | | | | | | ctg Leu | | | | | | | 1440 |
| | | | | | | | | | atg Met 490 | | | | | | | 1488 |
| gag Glu | ctg Leu | Val | ctc Leu 500 | gag Glu | gcc Ala | cca Pro | Lys | gag Glu 505 | GJλ aaa | gcg Ala | gag Glu | gcc Ala | gtg Val 510 | gcc Ala | cgg Arg | 1536 |
| | | | | | | | | | tat Tyr | | | | | | | 1584 |

515 520 525

gag gtg gag gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg 1632 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala

530 535 540

gcc gc 1637

Ala 545

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Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val

130 135 140

| Glu 145 | Arg | Pro | Leu | Ser | Ala 150 | Val | Leu | Ala | His | Met 155 | Glu | Ala | Thr | Gly | Val 160 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Arg | Leu | Asp | Val | Ala 165 | Tyr | Leu | Arg | Ala | Leu 170 | Ser | Leu | Glu | Val | Ala 175 | Glu |
| Glu | Ile | Ala | Arg 180 | Leu | Glu | Ala | Glu | Val 185 | Phe | Arg | Leu | Ala | Gly 190 | His | Pro |
| Phe | Asn | Leu 195 | Asn | Ser | Arg | Asp | Gln 200 | Leu | Glu | Arg | Val | Leu 205 | Phe | Asp | Glu |
| Leu | Gly 210 | Leu | Pro | Ala | Ile | Gly 215 | Lys | Thr | Glu | Lys | Thr 220 | Gly | Lys | Arg | Ser |
| Thr 225 | Ser | Ala | Ala | Val | Leu 230 | Glu | Ala | Leu | Arg | Glu 235 | Ala | His | Pro | Ile | Val 240 |
| Glu | Lys | Ile | Leu | Gln 245 | Tyr | Arg | Glu | Leu | Thr 250 | Lys | Leu | Lys | Ser | Thr 255 | Tyr |
| Ile | Asp | Pro | Leu 260 | Pro | Asp | Leu | Ile | His 265 | Pro | Arg | Thr | Gly | Arg 270 | Leu | His |
| Thr | Arg | Phe 275 | Asn | Gln | Thr | Ala | Thr 280 | Ala | Thr | Gly | Arg | Leu 285 | Ser | Ser | Ser |
| Asp | Pro 290 | Asn | Leu | Gln | Asn | Ile 295 | Pro | Val | Arg | Thr | Pro 300 | Leu | Gly | Gln | Arg |
| Ile 305 | Arg | Arg | Ala | Phe | Ile 310 | Ala | Glu | Glu | Gly | Trp 315 | Leu | Leu | Val | Ala | Leu 320 |
| Asp | Tyr | Ser | | Ile 325 | Glu | Leu | Arg | Val | Leu 330 | Ala | His | Leu | Ser | Gly 335 | Asp |

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg Lys Ala Ala Glu Arg Lys Ala Phe Asn Met Pro Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala

| Ala 545 · | | | |
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| ttc gtg ggc ttt g Phe Val Gly Phe V 20 | al Leu Ser Arg | | |
| ctg gcc ctg gcc g Leu Ala Leu Ala A 35 | | | |
| cct tat aaa gcc c Pro Tyr Lys Ala L 50 | | | |
| aaa gac ctg agc g Lys Asp Leu Ser V 65 | | Gly Leu Pro | |
| ggc gac gac ccc a Gly Asp Asp Pro M 8 | et Leu Leu Ala ' | | |
| acc ccc gag ggg g Thr Pro Glu Gly V 100 | al Ala Arg Arg ' | | |
| gcg ggg gag cgg go Ala Gly Glu Arg A 115 | | | |
| ggg agg ctt gag gg Gly Arg Leu Glu G 130 | | | |

| | Arg | | | | | | | | | | | | | | gtg Val 160 | 480 |
|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|-------------------|------|
| | | | | | | | | | | | | | | | gag Glu | 528 |
| | | gcc Ala | | | | | | | | | | | | | | 576 |
| ttc Phe | aac Asn | ctc Leu 195 | aac Asn | tcc Ser | cgg Arg | gac Asp | cag Gln 200 | ctg Leu | gaa Glu | agg Arg | gtc Val | ctc Leu 205 | ttt Phe | gac Asp | gag Glu | 624 |
| | | ctt Leu | | | | | | | | | | | | | | 672 |
| | | gcc Ala | | | | | | | | | | | | | | 720 |
| | | atc Ile | | | | | | | | | | | | | | 768 |
| | | ccc Pro | | | | | | | | | | | | | | 816 |
| acc Thr | Arg | ttc Phe 275 | Asn | Gln | Thr | Ala | Thr | Ala | Thr | Gly | Arg | Leu | Ser | agc Ser | tcc Ser | 864 |
| | | aac Asn | | | | | | | | | | | | | | 912 |
| | | cgg Arg | | | | | | | | | | | | | | 960 |
| | | agc Ser | | | | | | | | | | | | | | 1008 |
| | | ctg Leu | | | | | | | | | | | | | | 1056 |

340 345 350

| | | | Trp | | | | | Pro | ⊂gg Arg | | | | | | 1104 |
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| _ | | Arg | | _ | _ | | | | ttc Phe | | _ | Leu | | _ | 1152 |
| _ | Àla | | _ | | | _ | | | grcc Ala | | | | | _ | 1200 |
| | | | | | | | | | agc Ser 410 | | | | | | 1248 |
| | | | | | | | | | agg Arg | | | | | | 1296 |
| | | | | _ | - | _ | | | cca Pro | _ | | | | | 1344 |
| | | | | | | | | | agg Arg | | | | | | 1392 |
| - | | | _ | _ | _ | | _ | | ctg Leu | _ | _ | | _ | | 1440 |
| | | | | | | | | | atg Met 490 | | | | | | 1488 |
| | | | | | | | | | G J Y g⊝g | | | | | | 1536 |
| | | | | | | | | | tat Tyr | | | | | | 1584 |
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Ala 545

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<211> 545

<212> PRT

<213> Thermus aquaticus

<400> 81

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Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Arg Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 480

Pro Arg Leu Glu Met Gly Ala Arg Met Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 540

Ala 545

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165 170 175

| | | | | 100 |) | | | | 170 | ! | | | | 1/5 | 1 | |
|------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------------|-------------------|-------------------|------------|---------------------|------|
| | | | | , Leu | | | | | Phe | | | | | His | e ccc Pro | 576 |
| | | | . Asn | | | | | Leu | | | | | Phe | | grag Glu | 624 |
| | | Leu | | | | | Lys | | | | | Gly | | | t cc S er | 672 |
| | Ser | | | | | | | | | | Āla | | | | gtg Val 240 | 720 |
| | | | | | | | | | | | | | | | tac Tyr | 768 |
| | | | | | | | | | | | | | | | cac His | 816 |
| | | | | | | | | | | | | | | | tcc Ser | 864 |
| | | | | _ | | | | _ | - | | _ | | | _ | agg A r g | 912 |
| | | | | | | | | | | | | ttg Leu | | | ctg Leu 320 | 960 |
| - | | _ | _ | | | | | | _ | _ | | ctc Leu | | | _ | 1008 |
| gag Glu | aac Asn | ctg Leu | atc Ile 340 | cgg Arg | gtc Val | ttc Phe | cag Gln | gag Glu 345 | GJA aaa | cgg Arg | gac Asp | atc Ile | cac His 350 | acg Thr | gag GLu | 1056 |
| | Ala | | | | | Gly | | | | | | gtg Val 365 | | | | 1104 |
| atg | cgc | cgg | gcg | gcc | aag | acc | atc | aac | ttc | ggg | gtc | ctc | tac | ggc | atg | 1152 |

| | 7 | | | | | | | | | | | | | | | |
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| Met | Arg 370 | Arg | Ala | Ala | Lys | Thr 375 | Ile | Asn | Phe | Gly | Val 380 | Leu | Tyr | Gly | Met | |
| _ | _ | | _ | | | _ | | | | | | | ga g Gl u | | - | 1200 |
| | | | | | | | | | | | | | gt g Va l | | | 1248 |
| | | | | | | | | | | | | | tac Tyr 430 | | | 1296 |
| | | | | - | - | | | | | _ | | | gcc Ala | | | 1344 |
| | | | | | | | | | | | | | atg Met | | | 1392 |
| _ | | | - | _ | _ | | - | _ | _ | _ | _ | _ | aag Lys | | | 1440 |
| | | | | | | | | | | | | | gtc Val | | | 1488 |
| | | | | | | | | | | | | | gtg Val 510 | | | 1536 |
| | | | | | | | | | | | | | gtg Va l | | | 1584 |
| Glu | | | | | | | | | | | | | aag Lys | | | 1632 |
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<213> Thermus aquaticus

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Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu
165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Val Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu 420 425 430 Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445 Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460 Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480 Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495 Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510 Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 Ala 545 <210> 84 <211> 1637 <212> DNA<213> Thermus aquaticus <220>

<221>

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| | c gtg e Val | | | | | | | | | | | | | | | 96 |
| | g gcc u Ala | | | | | | | | | | | | | | | 144 |
| | t tat o Tyr 50 | | | | | | | | | | | | | | | 192 |
| | a gac s Asp | | | | | | | | | | | | | | | 240 |
| | c gac y Asp | | | | | | | | | | | | | | | 288 |
| | c ccc r Pro | | | | | | | | | | | | | | | 336 |
| gc Al | a Glà a aaa | gag Glu 115 | cgg Arg | gcc Ala | gcc Ala | ctt Leu | tcc Ser 120 | gag Glu | agg Arg | ctc Leu | ttc Phe | gcc Ala 125 | aac Asn | ctg Leu | tgg Trp | 384 |
| | g agg y Arg 130 | | | | | | | | | | | | | | | 432 |
| | g agg ı Arg | | | | | | | | | | | | | | | 480 |
| | c ctg g Leu | | | | | | | | | | | | | | | 528 |
| | g atc ı Ile | | | | | | | | | | | | | | | 576 |
| tto | c aac | ctc | aac | tcc | cgg | gac | cag | ctg | gaa | agg | gtc | ctc | ttt | gac | gag | 624 |

| Phe | . Asn | Let 195 | | Ser | Arg | Asp | Gln 200 | Glu | Arg | y Val | Let 205 | : Asp | Glu | |
|-----|-------|------------|-------------------|-----|-----|-----|------------|-----|-----|-------|------------|-------|-------------------|-------|
| | | Let | | | | | Lys | | | | Gly | | tcc Ser | 672 |
| | Ser | | gcc Ala | | - | | | _ | | Āla | | | gtg Val 240 | 720 |
| | | | ctg Leu | | Tyr | | | | Lys | | | | _ | 768 |
| | | | ttg Leu 260 | | | | | | | | | | | 816 |
| | | | aac Asn | | | | | | | | | | | 864 |
| | | | ctc Leu | | | | | | | | | | | 912 |
| | | | gcc Ala | | | | | | | | | | | · 960 |
| | | | cag Gln | | | | | | | | | | | 1008 |
| | | | atc Ile 340 | | | | | | | | | | | 1056 |
| | | | tgg Trp | | | | | | | | | | | 1104 |
| Met | | | gcg Ala | | Lys | | | | | | | | | 1152 |
| | | | cgc Arg | | | | | Ala | | | | | | 1200 |

| _ | gcc Ala | | | | - | | | _ | _ | | | | | | _ | 1248 |
|------------------------------|-------------------|-----------------------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| | att Ile | | | | | | | | | | | | | | | 1296 |
| | ctc Leu | | | | | | | | | | | | | | | 1344 |
| | agc Ser 450 | | | | | | | | | | | | | | | 1392 |
| | ggc Gly | | _ | - | _ | | _ | _ | _ | _ | _ | | _ | | | 1440 |
| | agg Arg | _ | | _ | _ | | - | | _ | | | - | - | | _ | 1488 |
| | ctg Leu | | | | | | | | | | | | | | | 1536 |
| _ | gcc Ala | | - | _ | _ | | | _ | | | - | - | _ | | | 1584 |
| Glu | gtg Val 530 | Glu | Val | Gly | Ile | Gly | Glu | Āsp | Trp | Leu | Ser | Āla | _ | | | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | 1637 |
| <210 <211 <212 <213 | > 5 > P | 5 45 RT herm | us a | quat | icus | | | | | | | | | | | |
| <400 | > 8 | 5 | | | | | | • | | | | | | | | |
| Ser : | Pro : | Lys . | | Leu | Glu | Glu . | Ala | | Trp | Pro | Pro | Pro | Glu | Gly | Ala | |

Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr . 90 Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp. Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Gln Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu

420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 480

Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 525

Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 540

Ala 545

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Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala
1 5 10 15

ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt 96

| Phe | Val | Gly | Phe 20 | Val | Leu | Ser | Arg | Lys 25 | Glu | Pro | Met | Trp | Ala 30 | Asp | Leu | |
|------------------|-------------------|-------------------|-------------------|------------|------------------|-------------------|-------------------|-------------------|------------|------------------|-------------------|-------------------|-------------------|------------|------------------|-----|
| ctg Leu | gcc Ala | ctg Leu 35 | gcc Ala | gcc Ala | gcc Ala | agg Arg | ggg Gly 40 | Gly | cgg Arg | gtc Val | cac His | cgg Arg 45 | gcc Ala | ccc Pro | gag Glu | 144 |
| | | aaa Lys | | | | | | | | | | | | | | 192 |
| aaa Lys 65 | gac Asp | ctg Leu | agc Ser | gtt Val | ctg Leu 70 | gcc Ala | ctg Leu | agg Arg | gaa Glu | ggc Gly 75 | ctt Leu | ggc Gly | ctc Leu | ccg Pro | ccc Pro 80 | 240 |
| | | gac Asp | | | | | | | | | | | | | | 288 |
| | | gag Glu | | | | | | | | | | | | | | 336 |
| gcg Ala | Gly ggg | gag Glu 115 | cgg Arg | gcc Ala | gcc Ala | ctt Leu | tcc Ser 120 | gag Glu | agg Arg | ctc Leu | ttc Phe | gcc Ala 125 | aac Asn | ctg Leu | tgg Trp | 384 |
| ggg Gly | agg Arg 130 | ctt Leu | gag Glu | Gly ggg | gag Glu | gag Glu 135 | agg Arg | ctc Leu | ctt Leu | tgg Trp | ctt Leu 140 | tac Tyr | cgg Arg | gag Glu | gtg Val | 432 |
| | | ccc Pro | | | | | | | | | | | | | | 480 |
| | | gac Asp | | | | | | | | | | | | | | 528 |
| gag Glu | atc Ile | gcc Ala | cgc Arg 180 | ctc Leu | gag Glu | gcc Ala | gag Glu | gtc Val 185 | ttc Phe | cgc Arg | ctg Leu | gcc Ala | ggc Gly 190 | cac His | ccc Pro | 576 |
| | | ctc Leu 195 | | | | | | | | | | | | | | 624 |
| | | ctt Leu | | _ | | | - | _ | | | | | | | | 672 |

| | Ser | : gcc | | | | Glu | | | | | ίĀla | | | | | 720 |
|------------|------------|-------------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------|
| | | ato | _ | _ | Tyr | | _ | | | Lys | _ | _ | - | | Tyr | 768 |
| | | ccc Pro | _ | Pro | _ | | | | | | _ | | _ | Leu | | 816 |
| | | ttc Phe 275 | Asn | | | | _ | Āla | _ | | | | _ | - | | 864 |
| _ | | aac Asn | | _ | | | | _ | _ | | _ | | | _ | | 912 |
| | | cgg Arg | | | | | | | | | | | | | | 960 |
| | | agc Ser | | | | | | | | | | | | | | 1008 |
| | | ctg Leu | | | | | | | | | | | | | | 1056 |
| | | agc Ser 355 | | | | | - | | | | _ | | _ | | _ | 1104 |
| | | cgg Arg | | | | | | | | | - | | | | - | 1152 |
| | | cac His | | | | | | | | | | | | | | 1200 |
| | | ttc Phe | | | | | | _ | _ | | | - | | | _ | 1248 |
| tgg Trp | att Ile | gag Glu | aag Lys 420 | acc Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | Gly ggg | tac Tyr 430 | gtg Val | gag Glu | 1296 |

| | | ttc Phe 435 | | | | | | | | | | | | | | | 1344 |
|------------------------------|--------------|---------------------------|-----------|----------|-------|-----|-----------|-----------|-----------|-----|-----|-----------|-----------|-----------|-----|---|------|
| | | gtg Val | | | | | | | | | | | | | | | 1392 |
| | | acc Thr | | | | | | | | | | | | | | | 1440 |
| | | ctg Leu | | | | | | | | | | | | | | ; | 1488 |
| | | gtc Val | | | | | | | | | | | | | | | 1536 |
| | | aag Lys 515 | | | | | | | | | | | | | | | 1584 |
| | | gag Glu | | | | | | | | | | | | | | - | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | - | 1637 |
| <210 <211 <212 <213 | .> 5 :> E | 37 345 PRT Therm | ıus a | ıquat | cicus | 3 | | | | | | | | | | | |
| <400 | > 8 | 37 | | | | | | | | | | | | | | | |
| Ser 1 | Pro | Lys | Ala | Leu 5 | Glu | Glu | Ala | Pro | Trp 10 | Pro | Pro | Pro | Glu | Gly 15 | Ala | | |
| Phe | Val | Gly | Phe 20 | Val | Leu | Ser | Arg | Lys 25 | Glu | Pro | Met | Trp | Ala 30 | Asp | Leu | | |
| Leu | Ala | Leu 35 | Ala | Ala | Ala | Arg | Gly 40 | Gly | Arg | Val | His | Arg 45 | Ala | Pro | Glu | | |

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu Glu 100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr

245 250 255

Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Lys Ala Phe Asn Met Pro Val 455 460 Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495 Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 Ala 545 <210> 88 <211> 1637 <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (1)..(1635)<400> 88 age ece aag gee etg gag gee eee tgg eee eeg gaa ggg gee 48 Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Glu Gly Ala 1 10 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt 96 Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 ctg gcc ctg gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag 144 Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

| cct Pro | tat Tyi 50 | c aaa C Lys | a gco s Ala | c cto a Leo | c ago | g gad g Asp 55 | c cto | g aaq u Ly: | g gaq s Gli | g gc ı Al | g cg a Arq 60 | g Gl | g ct y Le | t cto u Leo | c gcc ı Ala | 192 |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------|-------------------|-------------------|-------------------|----------------------|---------------------|------------------------|---------------------|-------------------|--------------------|-----|
| aa <i>a</i> Lys 65 | gac Asp | c ctg Leu | g ago i Ser | gtt Val | cto Lev 70 | g gco ı Ala | cto Lei | g ago | g gaa g Gli | a ggo 1 Gly 75 | c cti y Lei | z ggo ı Gly | c cto y Leo | c cco | g ccc Pro 80 | 240 |
| GJ A G G G | gac Asp | gac Asp | cco Pro | atç Met 85 | g cto : Leu | cto Leu | gco Ala | c tac a Tyr | cto Leu 90 | c cto 1 Lei | g gad ı Asp | c cct o Pro | tco Sei | aad Asr 95 | acc Thr | 288 |
| acc Thr | ccc Pro | gag Glu | ggg Gly 100 | Val | gcc Ala | cgg Arg | cgc | tac Tyr 105 | Gly | . GJŽ | g gag 7 Glu | ı tg <u>o</u> ı Trp | g aco Thr 110 | Glu | gag Glu | 336 |
| gcg Ala | Glà aaa | gag Glu 115 | cgg Arg | gcc Ala | gcc Ala | ctt Leu | tcc Ser 120 | Glu | agg Arg | cto Leu | ttc Phe | gcc Ala 125 | Asn | ctg Leu | tgg Trp | 384 |
| ej gaa | agg Arg 130 | ctt Leu | gag Glu | GJA aaa | gag Glu | gag Glu 135 | Arg | ctc Leu | ctt Leu | tgg Trp | ctt Leu 140 | Tyr | cgg Arg | gag Glu | gtg Val | 432 |
| gag Glu 145 | agg Arg | ccc Pro | ctt Leu | tcc Ser | gct Ala 150 | gtc Val | ctg Leu | gcc Ala | cac His | atg Met 155 | Glu | gcc Ala | acg Thr | gjà aaa | gtg Val 160 | 480 |
| cgc Arg | ctg Leu | gac Asp | gtg Val | gcc Ala 165 | tat Tyr | ctc Leu | agg Arg | gcc Ala | ttg Leu 170 | tcc Ser | ctg Leu | gag Glu | gtg Val | gcc Ala 175 | gag Glu | 528 |
| gag Glu | atc Ile | Ala | cgc Arg 180 | Leu | gag Glu | gcc Ala | gag Glu | gtc Val 185 | ttc Phe | cgc Arg | ctg Leu | gcc Ala | ggc Gly 190 | cac His | ccc Pro | 576 |
| ttc Phe | aac Asn | ctc Leu 195 | aac Asn | tcc Ser | cgg Arg | gac Asp | cag Gln 200 | ctg Leu | gaa Glu | agg Arg | gtc Val | ctc Leu 205 | ttt Phe | gac Asp | gag Glu | 624 |
| Leu | ggg Gly 210 | ctt Leu | ccc Pro | gcc Ala | atc Ile | ggc Gly 215 | aag Lys | acg Thr | gag Glu | aag Lys | acc Thr 220 | ggc Gly | aag Lys | cgc Arg | tcc Ser | 672 |
| acc Thr 225 | agc Ser | gcc Ala | gcc Ala | Val | ctg Leu 230 | gag Glu | gcc Ala | ctc Leu | Arg | gag Glu 235 | gcc Ala | cac His | ccc Pro | atc Ile | gtg Val 240 | 720 |
| gag (Glu) | aag Lys | atc Ile : | Leu | cag Gln 245 | tac Tyr | cgg Arg | gag Glu | Leu | acc Thr 250 | aag Lys | ctg Leu | aag Lys | Ser | acc Thr 255 | tac Tyr | 768 |

| att Ile | gac Asp | ccc Pro | tto Lev 260 | ı Pro | g gad Asp | cto Lev | ato Ile | c cac His 265 | s Pro | c ago | g acq g Thi | g ggd r Gly | c cgc / Arc 270 | j Lei | c cac 1 His | 816 |
|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|-------------------|-------------------|-----------------------|-----------------------|-----------------------|-------------------|-------------------|------|
| acc Thr | cgc Arg | ttc Phe 275 | Asn | cag Glr | , acç ı Thr | gcc Ala | aco Thr 280 | : Ala | aco Thr | : GJ7 | c ago y Aro | g cta g Leu 285 | Ser | ago Ser | tcc Ser | 864 |
| gat Asp | ccc Pro 290 | Asn | ctc Leu | cag Gln | aac Asn | atc Ile 295 | Pro | gtc Val | cgc Arg | acc Thr | 2 ccg 2 Pro 300 | Leu | ggg | cag Gln | agg Arg | 912 |
| atc Ile 305 | Arg | cgg Arg | gcc Ala | ttc Phe | atc Ile 310 | gcc Ala | gag Glu | gag Glu | Gly | tgg Trp 315 | Let | ttg Leu | gtg Val | gcc Ala | Leu 320 | 960 |
| gac Asp | tat Tyr | agc Ser | cag Gln | ata Ile 325 | gag Glu | ctc Leu | agg Arg | gtg Val | ctg Leu 330 | Ala | cac His | ctc Leu | tcc Ser | ggc Gly 335 | Asp | 1008 |
| gag Glu | aac Asn | ctg Leu | atc Ile 340 | cgg Arg | gtc Val | ttc Phe | cag Gln | gag Glu 345 | GJÀ aaa | cgg Arg | gac Asp | atc Ile | cac His 350 | acg Thr | gag Glu | 1056 |
| acc Thr | gcc Ala | agc Ser 355 | tgg Trp | atg Met | ttc Phe | ggc Gly | gtc Val 360 | ccc Pro | cgg Arg | gag Glu | gcc Ala | gtg Val 365 | gac Asp | ccc Pro | ctg Leu | 1104 |
| atg Met | cgc Arg 370 | cgg Arg | gcg Ala | gcc Ala | aag Lys | acc Thr 375 | atc Ile | aac Asn | ttc Phe | Gly ggg | gtc Val 380 | ctc Leu | tac Tyr | ggc Gly | atg Met | 1152 |
| tcg Ser 385 | gcc Ala | cac His | cgc Arg | ctc Leu | tcc Ser 390 | cag Gln | gag Glu | cta Leu | gcc Ala | atc Ile 395 | cct Pro | tac Tyr | gag Glu | gag Glu | gcc Ala 400 | 1200 |
| cag Gln | gcc Ala | ttc Phe | att Ile | gag Glu 405 | cgc Arg | aac Asn | ttt Phe | cag Gln | agc Ser 410 | ttc Phe | ccc Pro | aag Lys | gtg Val | cgg Arg 415 | gcc Ala | 1248 |
| tgg Trp | att Ile | Glu : | aag Lys 420 | acc Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | GJÀ aàa | tac Tyr 430 | gtg Val | gag Glu | 1296 |
| acc Thr | Leu | ttc (Phe (435 | ggc Gly | cgc Arg | cgc Arg | cgc Arg | tac Tyr 440 | gtg Val | cca Pro | gac Asp | cta Leu | gag Glu 445 | gcc Ala | cgg Arg | gtg Val | 1344 |
| aag Lys | agc Ser | gtg d Val <i>l</i> | cgg Arg | gag Glu | gcg Ala . | gcc Ala | gag Glu | cgc Arg | atg Met | gcc Ala | ttc Phe | aac Asn | atg Met | ccc Pro | gtc Val | 1392 |

| 450 | 455 | 460 | |
|--|---|---|------------------------------------|
| cag ggc acc gcc gc Gln Gly Thr Ala Al 465 | cc gac ctc atg a la Asp Leu Met I 470 | aag ctg gct atg gtg aa Lys Leu Ala Met Val Ly 475 | g ctc ttc 1440 s Leu Phe 480 |
| ccc agg ctg gag ga Pro Arg Leu Glu Gl 48 | lu Met Gly Ala A | gg atg ctc ctt cag gt rg Met Leu Leu Gln Va 490 | C cac gac 1488 1 His Asp 495 |
| gag ctg gtc ctc ga Glu Leu Val Leu Gl 500 | lu Ala Pro Lys G | ag ggg gcg gag gcc gt lu Gly Ala Glu Ala Va 05 51 | l Ala Arg |
| ctg gcc aag gag gt Leu Ala Lys Glu Va 515 | c atg gag ggg g 11 Met Glu Gly V 520 | tg tat ccc ctg gcc gto al Tyr Pro Leu Ala Va 525 | g ccc ctg 1584 l Pro Leu |
| gag gtg gag gtg gg Glu Val Glu Val Gl 530 | g ata ggg gag g y Ile Gly Glu A 535 | ac tgg ctc tcc gcc aag sp Trp Leu Ser Ala Lys 540 | g gag gcg 1632 s Glu Ala |
| gcc gc Ala 545 | | | 1637 |
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| Phe Val Gly Phe Val 20 | . Leu Ser Arg Ly 25 | s Glu Pro Met Trp Ala 30 | Asp Leu |
| Leu Ala Leu Ala Ala 35 | Ala Arg Gly Gl | y Arg Val His Arg Ala 45 | Pro Glu |
| Pro Tyr Lys Ala Leu 50 | Arg Asp Leu Ly: 55 | s Glu Ala Arg Gly Leu 60 | Leu Ala |

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro

65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu 100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

- Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300
- Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320
- Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335
- Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350
- Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365
- Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 380
- Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400
- Gln Ala Phe Ile Glu Arg Asn Phe Gln Ser Phe Pro Lys Val Arg Ala
 405 410 415
- Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu 420 425 430
- Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445
- Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460
- Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480

Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510 Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 Ala 545 <210> 90 <211> 1637 <212> DNA Thermus aquaticus <213> <220> <221> CDS <222> (1)..(1635)<400> 90 age eee aag gee etg gag gag gee eee tgg eee eeg gaa ggg gee 48 Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala 10 15 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt 96 Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 25 ctg gcc ctg gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag 144 Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 cct tat aaa gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc 192 Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 aaa gac ctg agc gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc 240 Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

| | _ | _ | | _ | | | _ | | | ctg Leu | _ | | | | | 288 |
|---|---|-----|---|-----|---|---|---|-----|---|-------------------|---|---|---|---|--|-----|
| | | | | | | | | | | GJY GGG | | | | | | 336 |
| | | | | _ | _ | | | Glu | | ctc Leu | | _ | | _ | | 384 |
| | | | | | | | | | | tgg Trp | | | | | | 432 |
| | | | | | | _ | _ | _ | | atg Met 155 | _ | _ | _ | | | 480 |
| _ | _ | _ | | _ | | | | _ | _ | tcc Ser | _ | | | _ | | 528 |
| | | | | | | | | | | cgc Arg | | | | | | 576 |
| | | | | | | _ | _ | _ | _ | agg Arg | _ | | | _ | | 624 |
| | | | | | | | | | | aag Lys | | | | | | 672 |
| | _ | _ | _ | _ | _ | | - | | _ | gag Glu 235 | _ | | | | | 720 |
| | | | | | | | | | | aag Lys | | | | | | 768 |
| | _ | Pro | _ | *** | - | | | | | agg Arg | _ | | _ | | | 816 |
| | _ | | | _ | - | _ | - | _ | _ | ggc Gly | | | _ | _ | | 864 |

275 280 285

| gat Asp | 290 |) Ası | c cto 1 Lei | c caq ı Glı | g aad n Asr | ato n Ile 295 | Pro | gto Val | c cgo L Arg | c aco | 2 ccg 2 Pro 300 |) Lei | z ggg | g caq 7 Glr | g agg n Arg | 912 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|---------------------|-------------------|-------------------|-------------------|-----------------------|-----------------------|-------------------|-------------------|-------------------------------|---------------------|------|
| ato Ile 305 | e Arg | e egg g Arg | g gco g Ala | c tto a Phe | c ato e Ile 310 | e Ala | gag Glu | gag Glu | ı GJ? ı aac | g tgg 7 Trp 315 | Let | a tto I Lei | g gto ı Val | g gco Ala | c ctg Leu 320 | 960 |
| gac Asp | tat Tyr | ago Ser | c cag Glr | ata 11e 325 | e Glu | g ctc Leu | agg Arg | gtg Val | ctg Leu 330 | ı Ala | cac His | cto Leu | tco Ser | ggc Gl _y 335 | gac Asp | 1008 |
| gag Glu | aac Asn | ctg Leu | ato Ile 340 | Arg | gtc Val | ttc Phe | cag Gln | gag Glu 345 | Gly | cgg Arg | gac Asp | ato Ile | cac His | Thr | gag Glu | 1056 |
| acc Thr | gcc Ala | agc Ser 355 | Trp | atg Met | ttc Phe | ggc Gly | gtc Val 360 | Pro | cgg Arg | gag Glu | gcc Ala | gtg Val 365 | Asp | ccc Pro | ctg Leu | 1104 |
| atg Met | cgc Arg 370 | Arg | gcg Ala | gcc Ala | aag Lys | acc Thr 375 | atc Ile | aac Asn | ttc Phe | Gly | gtc Val 380 | ctc Leu | tac Tyr | ggc | atg Met | 1152 |
| tcg Ser 385 | gcc Ala | cac His | cgc Arg | ctc Leu | tcc Ser 390 | cag Gln | gag Glu | cta Leu | gcc Ala | atc Ile 395 | cct Pro | tac Tyr | gag Glu | gag Glu | gcc Ala 400 | 1200 |
| cag Gln | gcc Ala | ttc Phe | att Ile | gag Glu 405 | cgc Arg | tgc Cys | ttt Phe | cag Gln | agc Ser 410 | ttc Phe | ccc Pro | aag Lys | gtg Val | cgg Arg 415 | gcc Ala | 1248 |
| tgg Trp | att Ile | gag Glu | aag Lys 420 | acc Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | gly ggg | tac Tyr 430 | gtg Val | gag Glu | 1296 |
| acc Thr | ctc Leu | ttc Phe 435 | ggc Gly | cgc Arg | cgc Arg | cgc Arg | tac Tyr 440 | gtg Val | cca Pro | gac Asp | cta Leu | gag Glu 445 | gcc Ala | cgg Arg | gtg Val | 1344 |
| aag Lys | agc Ser 450 | gtg Val | cgg Arg | gag Glu | gcg Ala | gcc Ala 455 | gag Glu | cgc Arg | atg Met | Ala | ttc Phe 460 | aac Asn | atg Met | ccc Pro | gtc Val | 1392 |
| cag Gln 465 | ggc Gly | acc Thr | gcc Ala | Ala | gac Asp 470 | ctc Leu | atg Met | aag Lys | Leu | gct Ala 475 | atg Met | gtg Val | aag Lys | ctc Leu | ttc Phe 480 | 1440 |
| ccc | agg | ctg | gag | gaa | atg | ajaa (| gcc | agg . | atg | ctc | ctt | cag | gtc | cac | gac | 1488 |

| Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495 | |
|---|------|
| gag ctg gtc ctc gag gcc cca aaa gag ggg gcg gag gcc gtg gcc cgg Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 510 | 1536 |
| ctg gcc aag gag gtc atg gag ggg gtg tat ccc ctg gcc gtg ccc ctg Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525 | 1584 |
| gag gtg gag gtg ggg ata ggg gag gac tgg ctc tcc gcc aag gag gcg Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 540 | 1632 |
| gcc gc Ala 545 | 1637 |
| <210> 91 <211> 545 <212> PRT <213> Thermus aquaticus | |
| Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala 1 5 10 15 | |
| Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30 | |
| Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45 | |
| Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala | |
| Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 | |
| | |

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

- Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125
- Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140
- Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160
- Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175
- Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190
- Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu
 195 200 205
- Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220
- Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 235 240
- Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255
- Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270
- Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285
- Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320

- Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335
- Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350
- Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365
- Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 380
- Gln Ala Phe Ile Glu Arg Cys Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415
- Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu 420 425 430
- Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445
- Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460
- Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480
- Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495
- Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 535 540 Ala 545 <210> 92 <211> 1637 <212> DNA <213> Thermus aquaticus <220> <221> CDS <222> (1)..(1635)<400> 92 age eee aag gee etg gag gag gee eee tgg eee eeg eeg gaa gge gee 48 Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala 10 15 ttc gtg ggc ttt gtg ctt tcc cgc aag gag ccc atg tgg gcc gat ctt 96 Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 25 ctg gcc ctg gcc gcc gcc agg ggg ggc cgg gtc cac cgg gcc ccc gag 144 Leu Ala Leu Ala Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45 cct tat aaa gcc ctc agg gac ctg aag gag gcg cgg ggg ctt ctc gcc 192 Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60 aaa gac ctg agc gtt ctg gcc ctg agg gaa ggc ctt ggc ctc ccg ccc 240 Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80 ggc gac gac ccc atg ctc ctc gcc tac ctc ctg gac cct tcc aac acc 288 Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 acc ccc gag ggg gtg gcc cgg cgc tac ggc ggg gag tgg acg gag gag 336 Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu

100 105 110

| | | | ı Arg | | | | | Glu | | | | | Asn | | tgg Trp | 384 |
|------------|-------------------|-------------------|-------------------|------------|------------|-------------------|-------------------|-------------------|------------|------------|-------------------|-------------------|-------------------|------------|-------------------|------|
| | | Leu | | | | | Arg | | | | | ı Tyr | | | gtg Val | 432 |
| | Arg | | | | | Val | | | | | | | | | gtg Val 160 | 480 |
| | | | | | | | | | | Ser | | | | | gag Glu | 528 |
| gag Glu | atc Ile | gcc Ala | cgc Arg 180 | ctc Leu | gag Glu | gcc Ala | gag Glu | gtc Val 185 | ttc Phe | cgc Arg | ctg Leu | gcc Ala | ggc Gly 190 | cac His | ccc Pro | 576 |
| ttc Phe | aac Asn | ctc Leu 195 | aac Asn | tcc Ser | cgg Arg | gac Asp | cag Gln 200 | ctg Leu | gaa Glu | agg Arg | gtc Val | ctc Leu 205 | ttt Phe | gac Asp | gag Glu | 624 |
| | | | | | | | | | | | | ggc Gly | | | | 6.72 |
| | | | | | | | | | | | | cac His | | | | 720 |
| | | | Leu | | | | | | | | | aag Lys | | | | 768 |
| | | | | | | | Ile | | | | | ggc Gly | | | | 816 |
| acc Thr | Arg | ttc Phe 275 | aac Asn | cag Gln | acg Thr | Ala | acg Thr 280 | gcc Ala | acg Thr | ggc | agg Arg | cta Leu 285 | agt Ser | agc Ser | tcc Ser | 864 |
| gat Asp | ccc Pro 290 | aac Asn | ctc Leu | cag Gln | Asn | atc Ile 295 | ccc Pro | gtc Val | cgc Arg | Thr | ccg Pro 300 | ctt Leu | ggg Gly | cag Gln | agg Arg | 912 |
| atc (| cgc | cgg | gcc · | ttc | aac | gcc (| gag | gag | ggg | tgg | cta | ttg | gtg | gcc | ctg | 960 |

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| Ile 305 | | g Arc | g Ala | a Phe | e Asr 310 | | ı Glı | ı Glu | ı Gly | y Trp 315 | | u Lei | u Vai | l Ala | a Leu 320 | |
|-------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------|-------------------|------|
| gac Asp | tat Tyr | ago Ser | c cag Glr | g ata n Ile 325 | e Glu | g cto 1 Leu | ago Aro | gtg Val | cto Lev 330 | ı Ala | c cad a His | c cto s Lei | c tco ı Sei | 335 335 | c gac / Asp | 1008 |
| gag Glu | aac Asn | ctg Leu | ato Ile 340 | arç | g gto g Val | tto Phe | cag Gln | gag Glu 345 | Gly | g ago 7 Aro | g gad J Asp | c ato | c cac His | Thi | g gag Glu | 1056 |
| acc Thr | gcc Ala | agc Ser 355 | Trp | ato Met | ttc Phe | ggc Gly | gto Val 360 | Pro | cgg Arg | gag Glu | gcc Ala | gto Val 365 | Asp | c ccc Pro | ctg Leu | 1104 |
| atg Met | cgc Arg 370 | Arg | gcg Ala | gcc Ala | : aag Lys | acc Thr 375 | atc Ile | aac Asn | ttc Phe | ggg | gtc Val 380 | . Leu | tac Tyr | ggc Gly | atg Met | 1152 |
| tcg Ser 385 | gcc Ala | cac His | cgc Arg | ctc Leu | tcc Ser 390 | cag Gln | gag Glu | cta Leu | gcc Ala | atc Ile 395 | Pro | tac Tyr | gag Glu | gag Glu | gcc Ala 400 | 1200 |
| | | | | | cgc Arg | | | | | | | | | | | 1248 |
| tgg Trp | att Ile | gag Glu | aag Lys 420 | acc Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | ggg | tac Tyr 430 | gtg Val | gag Glu | 1296 |
| acc Thr | ctc Leu | ttc Phe 435 | Gly | cgc Arg | cgc Arg | cgc Arg | tac Tyr 440 | gtg Val | cca Pro | gac Asp | cta Leu | gag Glu 445 | gcc Ala | cgg Arg | gtg Val | 1344 |
| | | | | | gcg Ala | | | | | | | | | | | 1392 |
| cag Gln 465 | ggc Gly | acc Thr | gcc Ala | gcc Ala | gac Asp 470 | ctc Leu | atg Met | aag Lys | ctg Leu | gct Ala 475 | atg Met | gtg Val | aag Lys | ctc Leu | ttc Phe 480 | 1440 |
| | | | | | atg Met | | | Arg | | | | | | | | 1488 |
| gag Glu | ctg Leu | Val | ctc Leu 500 | gag Glu | gcc Ala | cca Pro | Lys | gag Glu 505 | Gly aaa | gcg Ala | gag Glu | gcc Ala | gtg Val 510 | gcc Ala | cgg Arg | 1536 |

| _ | | _ | Glu | _ | | | | | | ccc Pro | - | _ | Val | | | 1584 |
|--------------------------|-----------|---------------------------|------------|-------------------|-----------|-----------|------------|------------|-----------|------------|-----------|------------|------------|-----------|-----------|-------|
| | | Lys | | | | | | | | ctc Leu | | | | | | 1 632 |
| gcc Ala 545 | | | | | | | | | | | | | | | | 1637 |
| <21 <21 <21 <21 | 1> 2> | 93 545 PRT Ther: | mus (| aqua [.] | ticu | S | | | | | | | | | | |
| <40 | 0> | 93 | | | | | | | | | | | | | | |
| Ser 1 | Pro | Lys | Ala | Leu 5 | Glu | Glu | Ala | Pro | Trp 10 | Pro | Pro | Pro | Glu | Gly 15 | Ala | |
| Phe | Val | Gly | Phe 20 | Val | Leu | Ser | Arg | Lys 25 | Glu | Pro | Met | Trp | Ala 30 | Asp | Leu | |
| Leu | Ala | Leu 35 | Ala | Ala | Ala | Arg | Gly 40 | Gly | Arg | Val | His | Arg 45 | Ala | Pro | Glu | |
| Pro | Tyr 50 | Lys | Ala | Leu | Arg | Asp 55 | Leu | Lys | Glu | Ala | Arg 60 | Gly | Leu | Leu | Ala | |
| Lys 65 | Asp | Leu | Ser | Val | Leu 70 | Ala | Leu | Arg | Glu | Gl y 75 | Leu | Gly | Leu | Pro | Pro 80 | |
| Gly | Asp | Asp | Pro | Met 85 | Leu | Leu | Ala | Tyr | Leu 90 | Leu | Asp | Pro | Ser | Asn 95 | Thr | |
| Thr | Pro | Glu | Gly 100 | Val | Ala | Arg | Arg | Tyr 105 | Gly | Gly | Glu | Trp | Thr 110 | Glu | Glu | |
| Ala | Gly | Glu 115 | Arg | Ala | Ala | Leu | Ser 120 | Glu | Arg | Leu | Phe | Ala 125 | Asn | Leu | Trp | |

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Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 . 230 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Asn Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu
420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 480

Pro Arg Leu Glu Met Gly Ala Arg Met Pro Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

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530 535 540

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| Gly | 7 Arg 130 | | ı Glü | ı Gly | g Glu | 135 | | , Leu | ı Lev | ı Trp | Leu 140 | | : Arg | g Glu | ı Val | |
|-------------------|-------------------|------------|-------------------|------------|-------------------|-------------------|------------|-------------------|------------|-------------------|-------------------|----------------------|-------------------|------------|---------------------|------|
| | Arg | | | | | Val | | | | | Glu | | | | g gtg Val 160 | 480 |
| | | | | | Tyr | | | | | Ser | | gag Glu | | | | 528 |
| | | | | Leu | | | | | Phe | | | gcc Ala | | His | | 576 |
| | | | | | | | | | | | | ct c Le u 20 5 | | | | 624 |
| cta Leu | ggg Gly 210 | ctt Leu | ccc Pro | gcc Ala | atc Ile | ggc Gly 215 | aag Lys | acg Thr | gag Glu | aag Lys | acc Thr 220 | gg c | aag Lys | cgc Arg | tcc Ser | 672 |
| | | | | | | | | | | | | cac His | | | | 720 |
| | | | | | | | | | | | | aag Lys | | | | 768 |
| att Ile | gac Asp | ccc Pro | ttg Leu 260 | ccg Pro | gac Asp | ctc Leu | atc Ile | cac His 265 | ccc Pro | agg Arg | acg Thr | gg⊂ | cgc Arg 270 | ctc Leu | cac His | 816 |
| | | | | | | Ala | | | | | | cta Leu 285 | | | | 864 |
| | | | | | | | | | | Thr | | ctt Leu | | | | 912 |
| atc Ile 305 | cgc Arg | cgg Arg | gcc Ala | Phe | atc Ile 310 | gcc Ala | gag Glu | gag Glu | Gly | tgg Trp 315 | cta Leu | ttg Leu | gtg Val | gcc Ala | ctg Leu 320 | 960 |
| | | | Gln | | | | | Val | | | | ctc Leu | | | | 1008 |

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| gaq Gl: | g aad 1 Asi | c cto n Lei | g ato 1 Ile 340 | e Ar | g gto g Vai | c tto L Phe | caç e Glr | g gag n Glu 345 | ıGly | g cgg y Arg | g gad g Asl | c ato | c ca e Hi 35 | s Th | g gag r Glu | |
|-------------------|-------------------|---------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|-----------------------|-------------------|------|
| aco Thi | c gcd r Ala | c ago sei 355 | r Trp | g ato Met | g tto E Phe | e ggc | gto Val | Pro | cgg Arg | g gag g Glu | g gco | c gtg a Val 365 | L As | c cc p Pro | c ctg Leu | 1104 |
| | | , Arc | | | | | Ile | | | | | L Let | | | atg / Met | 1152 |
| tcg Ser 385 | Ala | cac His | cgc Arg | cto Leu | tcc Ser 390 | Gln | gag Glu | r cta Leu | gcc Ala | ato Ile 395 | Pro | tac Tyr | gaq Glu | g gag ı Glu | gcc Ala 400 | 1200 |
| cag Gln | gcc Ala | ttc Phe | att | gag Glu 405 | Arg | tgc Cys | ttt Phe | cag Gln | agc Ser 410 | Phe | ccc Pro | aag Lys | gto Val | g egg L Arg 415 | Ala | 1248 |
| tgg Trp | att Ile | gag Glu | aag Lys 420 | Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | . GJĀ . aāā | tac Tyr 430 | gtg Val | gag Glu | 1296 |
| acc Thr | ctc Leu | ttc Phe 435 | ggc | cgc Arg | cgc Arg | cgc Arg | tac Tyr 440 | gtg Val | cca Pro | gac Asp | cta Leu | gag Glu 445 | gcc Ala | cgg Arg | gtg Val | 1344 |
| aag Lys | agc Ser 450 | gtg Val | cgg Arg | gag Glu | gcg Ala | gcc Ala 455 | gag Glu | cgc Arg | atg Met | gcc Ala | ttc Phe 460 | aac Asn | atg Met | ccc Pro | gtc Val | 1392 |
| cag Gln 465 | ggc Gly | acc Thr | gcc Ala | gcc Ala | gac Asp 470 | ctc Leu | atg Met | aag Lys | ctg Leu | gct Ala 475 | atg Met | gtg Val | gag Glu | ctc Leu | ttc Phe 480 | 1440 |
| ccc Pro | agg Arg | ctg Leu | gag Glu | gaa Glu 485 | atg Met | gly ggg | gcc Ala | agg Arg | atg Met 490 | ctc Leu | ctt Leu | cag Gln | gtc Val | cac His 495 | gac Asp | 1488 |
| gag Glu | ctg Leu | gtc Val | ctc Leu 500 | gag Glu | gcc Ala | cca Pro | aaa Lys | gag Glu 505 | ggg | gcg Ala | gag Glu | gcc Ala | gtg Val 510 | gcc Ala | cgg Arg | 1536 |
| ctg Leu | gcc Ala | aag Lys 515 | gag Glu | gtc Val | atg Met | Glu | ggg Gly 520 | gtg Val | tat Tyr | ccc Pro | ctg Leu | gcc Ala 525 | gtg Val | Ccc Pro | ctg Leu | 1584 |
| Glu | gtg Val 530 | gag Glu | gtg Val | GJA āāā | Ile | ggg Gly 535 | gag Glu | gac Asp | tgg Trp | Leu | tcc Ser 540 | gcc Ala | aag Lys | gag Glu | gcg Ala | 1632 |

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Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu

355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 375 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Cys Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Glu Leu Phe 465 470 480

Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 540

Ala 545

| <211> 1 <212> 1 | 96 1637 DNA Cherm | us aqu | aticı | ıs | | | | | | | | | | |
|------------------------------------|----------------------------|--------------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|---------------------|-----|
| | CDS (1) | (1635) | | | - | | | | | | | | | |
| <400> 9 agc ccc Ser Pro 1 | aag g | gcc cto Ala Leo 5 | g gag ı Glu | gag Glu | gcc Ala | ccc Pro | tgg Trp 10 | ccc Pro | ccg Pro | g ccg Pro | gaa Glu | ggg Gly 15 | gcc Ala | 48 |
| ttc gtg Phe Val | Gly E | itt gto Phe Val 20 | g ctt L Leu | tcc Ser | cgc Arg | aag Lys 25 | gag Glu | ccc Pro | atg Met | tgg Trp | gcc Ala 30 | gat Asp | ctt Leu | 96 |
| ctg gcc Leu Ala | ctg g Leu A 35 | gee ged Ala Ala | c gcc a Ala | agg Arg | ggg Gly 40 | Gly | cgg Arg | gtc Val | cac His | cgg Arg 45 | gcc Ala | ccc Pro | gag G l u | 144 |
| cct tat a Pro Tyr 1 50 | aaa g Lys A | scc cto La Leu | agg Arg | gac Asp 55 | ctg Leu | aag Lys | gag Glu | gcg Ala | cgg Arg 60 | GJÀ aaa | ctt Leu | ctc Leu | gcc Ala | 192 |
| aaa gac d Lys Asp 1 65 | ctg a Leu S | gc gtt er Val | ctg Leu 70 | gcc Ala | ctg Leu | agg Arg | gaa Glu | ggc Gly 75 | ctt Leu | ggc | ctc Leu | ccg Pro | ccc Pro 80 | 240 |
| ggc gac q Gly Asp <i>I</i> | gac c Asp P | cc atg ro Met 85 | ctc Leu | ctc Leu | gcc Ala | tac Tyr | ctc Leu 90 | ctg Leu | gac Asp | cct Pro | tcc Ser | aac Asn 95 | acc Thr | 288 |
| acc ccc g Thr Pro G | Glu G | gg gtg ly Val 00 | gcc Ala | cgg Arg | cgc Arg | tac Tyr 105 | ggc Gly | Gly ggg | gag Glu | tgg Trp | acg Thr 110 | gag Glu | ga g Gl u | 336 |
| gcg ggg g Ala Gly G 1 | gag co Slu Ar .15 | gg gcc rg Ala | gcc Ala | ctt Leu | tcc Ser 120 | gag Glu | agg Arg | ctc Leu | ttc Phe | gcc Ala 125 | aac Asn | ctg Leu | tgg Trp | 384 |
| ggg agg c Gly Arg L 130 | tt ga eu Gl | ag ggg Lu Gly | gag Glu | gag Glu 135 | agg Arg | ctc Leu | ctt Leu | tgg Trp | ctt Leu 140 | tac Tyr | cgg Arg | gag Glu | gtg Val | 432 |
| gag agg c Glu Arg P 145 | cc ct ro Le | t tcc eu Ser | gct Ala 150 | gtc Val | ctg Leu | gcc Ala | His | atg Met 155 | gag Glu | gcc Ala | acg Thr | Gly | gtg Val 160 | 480 |

| | g gac ı Asp | | | Tyr | | | | | Ser | | | | | Glu | | 528 |
|-----|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| | gcc Ala | | Leu | | | | | Phe | | | | | His | | | 576 |
| | ctc Leu 195 | | | | | | Leu | | | | | Phe | | | | 624 |
| | ctt Leu | | | | | | | | | | | | | | | 672 |
| Ser | gcc Ala | | | | | | | | | | | | | | | 720 |
| | atc Ile | | | | | | | | | | | | | | | 768 |
| | ccc Pro | | | | | | | | | | | | | | | 816 |
| | ttc Phe 275 | | | | | | | | | | | | | | | 864 |
| | aac Asn | | | | | | | | | | | | | | | 912 |
| | cgg Arg | | | | | | | | | | | | | | | 960 |
| | agc Ser | Gln | | | | | | | | | | | | | | 1008 |
| | ctg Leu | | | | | Gln | | | | | Ile | | | | . is | 1056 |
| Ala | agc Ser ' 355 | | | | Gly | | | | | Ala | | | | | Ξ | 1104 |

| ato Met | g cgc Arg 370 | y Arg | g gcg J Ala | gcc Ala | aag Lys | acc Thr 375 | Ile | aac Asn | ttc Phe | : ggg | gto Val | . Lev | tac Tyr | . GJ? | atg Met | | 1152 |
|-------------------|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---|------|
| tco Ser 385 | Ala | cac His | cgc Arg | ctc Leu | tcc Ser 390 | Gln | gag Glu | cta Leu | gcc Ala | atc Ile 395 | Pro | tac Tyr | gag Glu | gag Glu | gcc Ala 400 | | 1200 |
| cag Gln | gcc Ala | ttc Phe | att Ile | gag Glu 405 | cgc Arg | tac Tyr | ttt Phe | cag Gln | agc Ser 410 | ttc Phe | ccc | : aag Lys | gtg Val | cgg Arg 415 | Ala | | 1248 |
| tgg Trp | att Ile | gag Glu | aag Lys 420 | acc Thr | ctg Leu | gag Glu | gag Glu | ggc Gly 425 | agg Arg | agg Arg | cgg Arg | Gly | tac Tyr 430 | gtg Val | gag Glu | | 1296 |
| acc Thr | ctc Leu | ttc Phe 435 | ggc | cgc Arg | cgc Arg | cgc Arg | tac Tyr 440 | gtg Val | cca Pro | gac Asp | cta Leu | gag Glu 445 | gcc Ala | cgg Arg | gtg Val | | 1344 |
| aag Lys | agc Ser 450 | gtg Val | cgg Arg | gag Glu | gcg Ala | gcc Ala 455 | gag Glu | cgc Arg | atg Met | gcc Ala | ttc Phe 460 | aac Asn | atg Met | ccc Pro | gtc Val | | 1392 |
| cag Gln 465 | ggc Gly | acc Thr | gcc Ala | gcc Ala | gac Asp 470 | ctc Leu | atg Met | aag Lys | ctg Leu | gct Ala 475 | atg Met | gtg Val | aag Lys | ctc Leu | ttc Phe 480 | • | 1440 |
| | | | | | | | | | | | | | atc Ile | | | | 1488 |
| gag Glu | ctg Leu | Val | ctc Leu 500 | gag Glu | gcc Ala | cca Pro | Lys | gag Glu 505 | ggg Gly | gcg Ala | gag Glu | gcc Ala | gtg Val 510 | gcc Ala | cgg Arg | | 1536 |
| ctg Leu | Ala | aag Lys 515 | gag Glu | gtc Val | atg Met | Glu | ggg Gly 520 | gtg Val | tat Tyr | ccc Pro | ctg Leu | gcc Ala 525 | gtg Val | ccc Pro | ctg Leu | | 1584 |
| gag Glu | gtg Val 530 | gag Glu | gtg Val | Gly ggg | Ile | ggg Gly 535 | gag Glu . | gac Asp | tgg Trp | Leu | tcc Ser 540 | gcc Ala | aag Lys | gag Glu | gcg Ala | | 1632 |
| gcc Ala 545 | gc | | | | | | | | | | | | | | | | 1637 |

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<211> 545

<212> PRT

<213> Thermus aquaticus

<400> 97

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Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu 20 25 30

Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu
100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val 145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro

180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser 210 215 220

Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val 225 230 235 240

Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr 245 250 255

Ile Asp Pro Leu Pro Gly Leu Ile His Pro Arg Thr Gly Arg Leu His 260 265 270

Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser 275 280 285

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg 290 295 300

Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu 305 310 315 320

Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp 325 330 335

Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu 340 345 350

Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu 355 360 365

Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met 370 380

Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala 385 390 395 400

Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala 405 410 415

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu 420 425 430

Thr Leu Phe Gly Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 470 475 480

Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Ile His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu 515 520 525

Glu Val Glu Val Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala 530 540

Ala 545

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<212> DNA

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<220>

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| tto Phe | c aad e Asr | c cto 195 | ı Asr | c tco n Sei | c cgg Arg | g gad g Asp | c cag o Glr 200 | ı Let | g gaa ı Glu | a ago ı Aro | g gto g Val | c cto L Lei 205 | ı Phe | c gad e Asp | c gag o Glu | 62 | 24 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|-----------------------|-----------------------|-------------------|-------------------|-------------------|------|----|
| cta Lei | ggg Gly 210 | / Let | ccc Pro | gco Ala | ato Ile | ggc Gly 215 | Lys | g aco Thr | g gag Glu | g aag 1 Lys | g aco s Thr 220 | : Gly | c aaq v Lys | g ego s Aro | c tcc g Ser | 67 | 72 |
| acc Thr 225 | : Ser | gec Ala | gcc Ala | gtc Val | ctg Leu 230 | Glu | gcc Ala | cto Leu | cgc Arg | gag Glu 235 | ı Ala | cac His | ccc Pro | ato Ile | gtg Val 240 | 72 | 20 |
| gag Glu | aag Lys | atc Ile | ctg Leu | cag Gln 245 | Tyr | cgg Arg | gag Glu | ctc Leu | acc Thr 250 | Lys | ctg Leu | aag Lys | agc Ser | acc Thr 255 | tac Tyr | 76 | :8 |
| att Ile | gac Asp | ccc Pro | ttg Leu 260 | ccg Pro | gac Asp | ctc Leu | atc Ile | cac His 265 | ccc Pro | agg Arg | acg Thr | ggc | cgc Arg 270 | Leu | cac His | 81 | 6 |
| acc Thr | cgc Arg | ttc Phe 275 | Asn | cag Gln | acg Thr | gcc Ala | acg Thr 280 | gcc Ala | acg Thr | Gly | agg Arg | cta Leu 285 | agt Ser | agc Ser | tcc Ser | 86 | 4 |
| gat Asp | ccc Pro 290 | aac Asn | ctc Leu | cag Gln | aac Asn | atc Ile 295 | ccc Pro | gtc Val | cgc Arg | acc Thr | ccg Pro 300 | ctt Leu | ggg Gly | cag Gln | agg Arg | 91. | 2 |
| atc Ile 305 | cgc Arg | cgg Arg | gcc Ala | ttc Phe | atc Ile 310 | gcc Ala | gag Glu | gag Glu | Gly ggg | tgg Trp 315 | cta Leu | ttg Leu | gtg Val | gcc Ala | ctg Leu 320 | 960 | Э |
| gac Asp | tat Tyr | aac Asn | cag Gln | ata Ile 325 | gag Glu | ctc Leu | agg Arg | gtg Val | ctg Leu 330 | gcc Ala | cac His | ctc Leu | tcc Ser | ggc Gly 335 | gac Asp | 1008 | 3 |
| gag Glu | aac Asn | ctg Leu | atc Ile 340 | cgg Arg | gtc Val | ttc Phe | cag Gln | gag Glu 345 | Gly ggg | cgg Arg | gac Asp | atc Ile | cac His 350 | acg Thr | gag Glu | 1056 | õ |
| acc Thr | gcc Ala | agc Ser 355 | tgg Trp | atg Met | ttc Phe | ggc Gly | gtc Val 360 | ccc Pro | cgg Arg | gag Glu | gcc Ala | gtg Val 365 | gac Asp | ccc Pro | ctg Leu | 1104 | ļ |
| atg Met | cgc Arg 370 | cgg Arg | gcg Ala | gcc Ala | Lys | acc Thr 375 | atc Ile | aac Asn | ttc Phe | Gly | gtc Val 380 | ctc Leu | tac Tyr | ggc Gly | atg Met | 1152 | 1 |
| tcg Ser | gcc Ala | cac His | cgc Arg | ctc Leu | tcc Ser | cag Gln | gag Glu | cta Leu | gcc Ala | atc Ile | cct Pro | tac Tyr | gag Glu | gag Glu | gcc Ala | 1200 | |

| 385 | 390 | 395 | 400 |
|---|-----------------|---|------|
| | | cag agc ttc ccc aag Gln Ser Phe Pro Lys 410 | |
| | Thr Leu Glu Glu | ggc agg agg cgg ggg Gly Arg Arg Arg Gly 425 | |
| | | gtg cca grac cta gag Val Pro Asp Leu Glu 445 | |
| | | cgc atg grcc ttc aac Arg Met Ala Phe Asn 460 | |
| | | aag ctg gct atg gtg Lys Leu Ala Met Val 475 | |
| | | agg atg ctc ctt cag Arg Met Leu Leu Gln 490 | |
| | Glu Ala Pro Lys | gag ggg gcg gag gcc Glu Gly Ala Glu Ala 505 | |
| | | gtg tat ccc ctg gcc Val Tyr Pro Leu Ala , 525 | |
| | | gac tgg ctc tcc gcc Asp Trp Leu Ser Ala : 540 | |
| gcc gc Ala 545 | | | 1637 |
| <210> 99 <211> 545 <212> PRT <213> Thermus a | quaticus | | |

PCT/IB2005/000734

WO 2005/083068

Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala

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Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu 35 40 45

Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala 50 55 60

Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro 65 70 75 80

Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr 85 90 95

Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu 100 105 110

Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp 115 120 125

Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val 130 135 140

Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val
145 150 155 160

Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu 165 170 175

Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro 180 185 190

Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu 195 200 205

203

Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arq Thr Pro Leu Gly Gln Arq Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Asn Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala

Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val Glu
420 425 430

Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val 435 440 445

Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val 450 455 460

Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe 465 470 475 480

Pro Arg Leu Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp 485 490 495

Glu Leu Val Leu Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg 500 505 510

Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Ser Leu 515 . 520 525

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<213> Thermus aquaticus

<400> 100

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Val Asp Gly His His Leu Ala Tyr Arg Thr Phe His Ala Leu Lys Gly
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Leu Thr Thr Ser Arg Gly Glu Pro Val Gln Ala Val Tyr Gly Phe Ala 35 40 45

Lys Ser Leu Lys Ala Leu Lys Glu Asp Gly Asp Ala Val Ile Val 50 55 60

Val Phe Asp Ala Lys Ala Pro Ser Phe Arg His Glu Ala Tyr Gly Gly 65 70 75 80

Tyr Lys Ala Gly Arg Ala Pro Thr Pro Glu Asp Phe Pro Arg Gln Leu 85 90 95

Ala Leu Ile Lys Glu Leu Val Asp Leu Leu Gly Leu Ala Arg Leu Glu 100 105 110

Val Pro Gly Tyr Glu Ala Asp Asp Val Leu Ala Ser Leu Ala Lys Lys 115 120 125

Ala Glu Lys Glu Gly Tyr Glu Val Arg Ile Leu Thr Ala Asp Lys Asp 130 135 140 .

Leu Tyr Gln Leu Leu Ser Asp Arg Ile His Val Leu His Pro Glu Gly 145 150 150 160

Tyr Leu Ile Thr Pro Ala Trp Leu Trp Glu Lys Tyr Gly Leu Arg Pro 165 170 175

Asp Gln Trp Ala Asp Tyr Arg Ala Leu Thr Gly Asp Glu Ser Asp Asn 180 185 190

Leu Pro Gly Val Lys Gly Ile Gly Glu Lys Thr Ala Arg Lys Leu Leu 195 200 205

Glu Glu Trp Gly Ser Leu Glu Ala Leu Leu Lys Asn Leu Asp Arg Leu 210 215 220

Lys Pro Ala Ile Arg Glu Lys Ile Leu Ala His Met Asp Asp Leu Lys 225 230 235 240

Leu Ser Trp Asp Leu Ala Lys Val Arg Thr Asp Leu Pro Leu Glu Val 245 250 255

Asp Phe Ala Lys Arg Glu Pro Asp Arg Glu Arg Leu Arg Ala Phe 260 265 270

Leu Glu Arg Leu Glu Phe Gly Ser Leu Leu His Glu Phe Gly Leu Leu 275 280 285

Glu Ser Pro Lys Ala Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly 290 295 300

Ala Phe Val Gly Phe Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp 305 310 315 320

Leu Leu Ala Leu Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro 325 330 335

Glu Pro Tyr Lys Ala Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu 340 345 350

Ala Lys Asp Leu Ser Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro 355 360 365

Pro Gly Asp Asp Pro Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn 370 380

Thr Thr Pro Glu Gly Val Ala Arg Arg Tyr Gly Glu Trp Thr Glu 385 390 395 400

Glu Ala Gly Glu Arg Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu 405 410 415

Trp Gly Arg Leu Glu Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu
420 425 430

Val Glu Arg Pro Leu Ser Ala Val Leu Ala His Met Glu Ala Thr Gly

435 440 445

Val Arg Leu Asp Val Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala 450 455 460

Glu Glu Ile Ala Arg Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His 465 470 475 480

Pro Phe Asn Leu Asn Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp 485 490 495

Glu Leu Gly Leu Pro Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg 500 505 510

Ser Thr Ser Ala Ala Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile 515 520 525

Val Glu Lys Ile Leu Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr 530 535 540

Tyr Ile Asp Pro Leu Pro Asp Leu Île His Pro Arg Thr Gly Arg Leu 545 555 560

His Thr Arg Phe Asn Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser 565 570 575

Ser Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln 580 585 590

Arg Ile Arg Arg Ala Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala 595 600 605

Leu Asp Tyr Ser Gln Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly 610 620

Asp Glu Asn Leu Ile Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr 625 630 635 640

Glu Thr Ala Ser Trp Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro 645 650 655

Leu Met Arg Arg Ala Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly 660 665 670

Met Ser Ala His Arg Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu 675 680 685

Ala Gln Ala Phe Ile Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg 690 695 700

Ala Trp Ile Glu Lys Thr Leu Glu Glu Gly Arg Arg Gly Tyr Val 705 710 715 720

Glu Thr Leu Phe Gly Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg 725 730 735

Val Lys Ser Val Arg Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro 740 745 750

Val Gln Gly Thr Ala Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu 755 760 765

Phe Pro Arg Leu Glu Glu Met Gly Ala Arg Met Leu Leu Gln Val His 770 780

Asp Glu Leu Val Leu Glu Ala Pro Lys Glu Arg Ala Glu Ala Val Ala 785 790 795 800

Arg Leu Ala Lys Glu Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro 805 810 815

Leu Glu Val Glu Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu 820 825 830

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<212> DNA

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|----------------|---|------------|
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| <223> | Synthetic DNA | |
| <400> | | |
| ggatg | gaacc gctggagagc aactg | 25 |
| <210> | 102 | |
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| 5 | | 23 |
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| J | | 9 4 |
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| | | J 2 |
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25

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